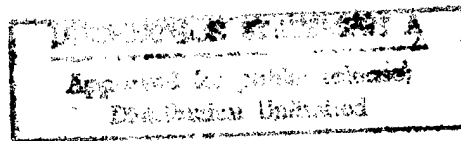


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8 November 1982



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# USSR Report

CHEMISTRY

No. 93



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## USSR REPORT

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## ADSORPTION

UDC 541.183.1.539.217.1

### BASIC FACTORS AFFECTING POROUS STRUCTURE OF HYDROXIDE AND OXIDE ADSORBENTS

Moscow KOLLOIDNYY ZHURNAL in Russian Vol 44, No 4, Jul-Aug 82  
(manuscript received 20 Apr 81) pp 780-783

NEYMARK, I. Ye., Institute of Physical Chemistry, UkSSR Academy of Sciences, Kiev

[Abstract] The title information has great significance for development of the adsorbent synthesis theory and for determining catalyst bearers with given properties. Using extensive experimental materials, the author sought to present basic factors affecting the structure and individual features of pore formation for silica gels, alumogels, titanogels, and gels of zirconium, iron, chromium and magnesium hydroxides as well as other specific adsorbents. The transition of sols to hydrogels is characterized by aggregation of primary particles whose dimensions depend on the conditions of the transformation, and changes continue to occur with further aggregation and thickening. A gel with low relative surface area can be promoted by an alkaline medium, aging and processing with dehydrating substances that break down the hydrate coatings. In drying a hydrogel or coagel the skeleton is reduced by a factor of 10 or more thanks to capillary action. Other details of the formation of porosity are also discussed. References 16 (Russian).  
[318-12131]

UDC 541.183.5

### REGENERATION OF POLYSORB BY ETHANOL AFTER ADSORPTION OF ANILINE OR NITROBENZENE FROM AQUEOUS SOLUTIONS

Kiev KHIMIYA I TEKHNLOGIYA VODY in Russian Vol 4, No 4, Jul-Aug 82  
(manuscript received 14 Dec 81) pp 307-308

POLYAKOVA, V. V., Institute of Colloid Chemistry and Water Chemistry imeni A. V. Dumanskiy, Ukrainian SSR Academy of Sciences, Kiev

[Abstract] Details are provided for the regeneration of polysorb C with ethanol following adsorption of aniline or nitrobenzene from aqueous solutions.

Treatment of one volume of the adsorbent with two volumes of ethanol removed 85% of the adsorbed aniline, while treatment with 4.5 volumes of ethanol resulted in complete regeneration of polysorb C. Five volumes were required for complete regeneration following nitrobenzene adsorption. The adsorptive capacity of polysorb C was not altered by several cycles of regeneration. Figures 1; references 9: 5 Russian, 4 Western.  
[330-12172]

## AEROSOLS

UDC 541.18.2:53.082.5

### QUANTITATIVE ANALYSIS OF MULTICOMPONENT AEROSOLS BY ELECTRON MICROSCOPE METHODS

Moscow KOLLOIDNYY ZHURNAL in Russian Vol 44, No 4, Jul-Aug 82  
(manuscript received 27 Feb 81) pp 790-794

PASHCHENKO, S. E., KUTSENOGIY, K. P., LAZAREVA, L. S., BAKLANOV, A. M. and  
PASHCHENKO, A. E., Institute of Chemical Kinetics and Combustion, Siberian  
Branch, USSR Academy of Sciences, Novosibirsk

[Abstract] Simple aerosols have frequently been studied without considering specific interaction between the electrons of the microscope and the lens. With complex aerosols, the mechanism of image formation must be taken into account, including features in addition to the nuclei and shells. Here the authors present results of theoretical consideration of the contrast of double particles and comparison of these with experimental data. They discuss a formula for determining the density of a current passing through a particle that considers density of nucleus and shell, the shortest path for electrons within shell and nucleus at a given coordinate, and the effective section of electron distribution. This formula and a variant for double particles agree with experimental data for particles with nuclei of sodium chloride and shells of silver iodide and metallic bismuth, and also particles with latex nuclei and bismuth iodide shells. Figures 4; references 12: 9 Russian, 3 English.  
[318-12131]

## REACTION OF LEAD CHLORIDE WITH AMMONIUM HYDRO- AND DIHYDROPHOSPHATE IN AQUEOUS SOLUTIONS

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 27, No 8, Aug 82  
(manuscript received 27 Jul 81) pp 1977-1980

VEL'MOZHNYI, I. S., Simferopol' State University imeni M. V. Frunze

[Abstract] The composition of lead orthophosphates precipitated from aqueous solutions depends on the nature of the cation of the dissolved phosphate and the phosphate's degree of substitution. To further study these factors, the authors sought to determine the composition and formation process of poorly soluble products of the reaction of  $PbCl_2$  with  $NH_4H_2PO_4$  and  $(NH_4)_2HPO_4$ . They studied two isomolar series of mixtures with 0.02 mol/liter overall concentration, making X-ray photographs of precipitates by a powder diffraction method. When lead chloride reacts with the dihydrophosphate,  $Pb_2(PO_4)_2$  is precipitated; when lead chloride reacts with the monohydrophosphate,  $Pb_3(PO_4)_2$  precipitates when the mole ratio of  $(NH_4)_2HPO_4$  to  $PbCl_2$  is 2:3,  $PbHPO_4$  precipitates at ratio of 1:1,  $Pb_4(NH_4)(PO_4)_3$  when the mole ratio is greater than 2. Comparison of the results obtained in studying the systems produced with data on reactions of lead chloride with sodium and potassium hydro- and dihydrophosphates support the conclusion that the key to the nature of the reaction is the nature of the cation of the dissolved phosphate. Thus, with the sodium and potassium variants, only  $Pb_2ClPO_4$  precipitated out, while in systems with  $NaH_2PO_4$  and  $KH_2PO_4$ ,  $Pb_5Cl(PO_4)_3$  formed. In systems with ammonium phosphates mixed chloride-phosphates did not form at all. Figures 3, references 4 (Russian).

[320-12131]

## BIOCHEMISTRY

UDC 547.775'779.1'813'461.3'052.2.07:543.422.51

### 6-AMINO-5-CYANO-1H,4H-PYRAZOLO[3,4-b]PYRANES

Riga KHIMIYA GETEROTSIKLICHESKIKH SOYEDINENIY in Russian No 6, Jun 82  
(manuscript first received 26 May 80, in revised form 28 Oct 81) pp 801-806

SHARANINA, L. G., PROMONENKOV, V. K., MARSHTUPA, V. P., PASHCHENKO, A. V.,  
PUZANOVA, V. V., SHARANIN, Yu. A., KLYUYEV, N. A., GUSEV, L. F. and  
GNATUSINA, A. P., Voroshilovgrad State Pedagogical Institute imeni  
T. G. Shevchenko, Voroshilovgrad

[Abstract] Derivatives of 2-aminopyranes have been tested as pesticides and medications with antiallergic and antiasthmatic effects. Their production has not, however, permitted variations of the substituent position. A simple method is described to obtain the title compounds by the reaction of 3-methyl-1-phenyl-5-pyrazolone with arylidenemalononitriles. Reactions of 5-pyrazolones with the latter work effectively in equimolar quantities in methyl alcohol with organic catalysts. Ultraviolet and PMR spectra are discussed. Isolated 4-(2,2-dicyanoethyl)-5-pyrazolones under identical conditions form 6-amino-5-cyano-1-phenyl-4-aryl-1H,4H-pyrazolo[3,4-b], pyranes with good yields; these can also be obtained by condensation of equimolar quantities of 3-methyl-1-phenyl-5-pyrazolone, aromatic aldehyde and malononitrile in methyl alcohol in the presence of morpholine. Two other types to disintegration of the gamma-pyrene ring are also discussed. The nature of coupling of the gamma-pyrene ring and the pyrazolone nucleus in the molecule were confirmed by the presence of F<sub>1</sub> and F<sub>2</sub> peaks in the mass-spectra. Chemical procedures are given in the experimental section. References 11: 4 Russian, 7 Western.  
[305-12131]

N-GLYCOSIDES, PART 2: STRUCTURE OF PRODUCTS OF REACTIONS OF GLYCOSYLISOCYANATES WITH 4-AMINO-4-METHYL-2-PENTANONES

Riga KHIMIYA GETEROTSIKLICHESKIKH SOYEDINENIY in Russian No 6, Jun 82  
(manuscript received 28 Jul 81) pp 825-829

SHUTALEV, A. D., IGNATOVA, L. A. and UNKOVSKIY, B. V., Moscow Institute of Fine Chemical Technology imeni M. V. Lomonosov, Moscow

[Abstract] Continuing earlier research (this journal No 2 1982), the authors conducted the reaction of 2,3,4,6-tetra-O-acetyl-beta-D-glucopyranosylisocyanate with a beta-aminoketone and obtained an N-glycoside, which they then deacetylated. The aglycones in several N-glycosides synthesized exist as acyclical hydrooxoalkylthiourea and cyclical 4-oxyhexahydropyrimidine-2-thion. Tautomeric balance between these forms was shown previously. The structure of the N-glycosides obtained was confirmed by ultraviolet, infrared and PMR spectra. An alternative synthesis of similar glycosides involved condensation of beta-D-glucopyranosylamine with 4-isothiocyano-4-methyl-2-pentanone, to yield in D-glucose and 4,6,6-trimethyl-4-oxyhexahydropyrimidine-2-thione. Further processing led to formation of diglucosylamine and pyrimidinethion instead of the expected N-glycoside. Chemical procedures are given in the experimental section. References 11: 4 Russian, 7 Western.  
[305-12131]

## CATALYSIS

UDC 541.(49+64):547.592.2

### COMPLEXES OF Rh(III) AND POLYETHYLIMINE AND THEIR CATALYTIC ACTIVITY IN CYCLOHEXANE HYDROGENATION

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 24, No 7, Jul 82  
(manuscript received 22 Apr 81) pp 1559-1564

PATSEVICH, I. V., OGORODNIKOV, I. A., FRIDMAN, A. I., NEFEDOV, V. I. and SALYN', Ya. V., Institute of Petrochemical Synthesis imeni A. V. Topchiyev, USSR Academy of Sciences; Institute of General and Inorganic Chemistry imeni N. S. Kurnakov, USSR Academy of Sciences

[Abstract] Besides the most common phosphorylated copolymer of styrene with divinylbenzene as a polymer matrix, other polymers with coordinationally-active functional groups such as polyethylimine (PEI) are also used. PEI has an amino group that bonds with many catalytically active metals of the transitional group. Study is reported of the connection between complex formation of Rh(III) with PEI and their catalytic activity. Chemical procedures are summarized. Previously, the authors had found that in linking PEI with organic dichlorides and diesters much of the linking agent is consumed by intramolecular cyclization. With dilution, linking may not take place at all. This and other findings show that Rh-PEI complexes have a pronounced structural heterogeneity. The authors describe features of such structures and hypothesize that rhodium clusters are present in certain variations. With increased activity of PEI-C<sub>4</sub>H<sub>9</sub> complexes, higher concentrations of Rh(I) from hydration are found. Figures 2, references 12: 9 Russian, 3 Western.  
[301-12131]



## CATALYTIC ACTIVITY OF AUTOCLAVE COPPER IN DIRECT SYNTHESIS OF METHYLCHLORO-SILANES

Tibilisi SOOBShCHENIYA AKADEMII NAUK GRUZINSKOY SSR Vol 105, No 2, Feb 82  
(manuscript received 24 Apr 81) pp 321-324

STARODUBTSEV, E. S., KHANANASHVILI, L. M., corresponding member, GSSR Academy of Sciences, KOZLOVA, G. N., GASANOVA, L. V., TSOMAYA, N. I., GELEYSHVILI, T. P. and KALANOV, D. F., Tbilisi State University; Zaporozhye "Kremniypolimer" Plant, Madneulskiy Ore Enrichment Complex

[Abstract] Basic components of the contact masses for direct synthesis of organochlorosilanes are silicon and copper, neither of which function independently in the reaction. Obtaining copper-silicon alloys requires large energy inputs, and data on mechanical mixtures are contradictory. Tests are reported of the use of powdered copper from the Madneulskiy Ore Enrichment Complex as a catalyst measuring its activity in relation to copper content. Data showed that the rate of silicon reaction and methylchlorosilane formation were in direct correlation with copper content. The test powder provided yields that were comparable to those obtained using the expensive alloy and those from the powdered copper imported from West Germany. To increase the catalytic activity of the powdered copper contact mass, which contained 8% autoclave copper, 4%  $\text{CdCl}_2$  was added, thus increasing yield of dimethylchlorosilanes<sub>2</sub> and methylchlorosilanes to 60.7% as an increased reaction rate. References 8: 4 Russian, 4 Western.  
[299-12131]

## STRUCTURAL ASPECTS OF PHYSICAL CHEMICAL PROPERTIES OF TIN-CONTAINING HOMOGENEOUS AND HETEROGENEOUS CATALYSTS

Novosibirsk ZHURNAL STRUKTURNY KHIMII in Russian Vol 23, No 3, May-Jun 82  
(manuscript received 17 Dec 81) pp 63-78

YURCHENKO, E. N., KUZNETSOV, V. I. and AL'T, L. Ya., Institute of Catalysis, Siberian Branch, USSR Academy of Sciences

[Abstract] Active research on the use of bivalent tin compounds as homogeneous catalysts has become an important direction in study at the authors' institute. The authors review progress in such compounds in sub-sections devoted to selection of the best initial compounds of Sn(II), involving sufficient simplicity for structural identification and practical potential. They have employed YaGR spectroscopy (Nuclear Moessbauer spectroscopy?) on  $^{119}\text{Sn}$  nuclei to study structure and properties of the compounds, IR spectroscopy and NMR spectroscopy in studying Sn(II)-containing complexes of transitional metals.

NMR spectroscopy was regarded to be applicable only to such complexes in a solution. Analysis of the number of components in  $^{31}\text{P}$  and  $^{195}\text{Pt}$ -containing tin-phosphorus complexes was found to provide dependable information on the type of isomers in the solutions, and with study of temperature and concentration factors, on the mechanism of the transfer on particular complexes to others. NMR spectra were found to supplement the basic information obtained by YaGR spectroscopy the best method of analysis. Figures 9, references 43: 33 Russian, 10 Western.  
[313-12131]

UDC 661.566.097.3

#### VOLATILITY OF OXIDES USED AS CATALYSTS FOR AMMONIA OXIDATION AT HIGH TEMPERATURES

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 55, No 7, Jul 82  
(manuscript received 16 Oct 80) pp 1497-1500

STAROVOYTOV, A. F., KOSYAK, A. A., ANOKHIN, V. N. and KANALINA, V. S.

[Abstract] Since highly volatile contact masses can overload catalysts, the authors studied the volatility of catalysts based on  $\text{Cr}_2\text{O}_3$  with alloys  $\text{Li}_2\text{O}$ ,  $\text{BeO}$ ,  $\text{MgO}$ ,  $\text{CaO}$ ,  $\text{Bi}_2\text{O}_3$ ,  $\text{Al}_2\text{O}_3$ , and  $\text{Fe}_2\text{O}_3$ , at  $800-1000^\circ$ , duplicating the temperature of production oxidation of ammonia by atmospheric oxygen. Comparison of vapor expansion indicated that the volatility of an alloyed chromium system declines with a reduction of general vapor pressure above the alloying oxide with all but  $\text{MgO}$  and  $\text{Fe}_2\text{O}_3$ . Dissociation of  $\text{MgO}$  in the presence of a chromium-lithium system apparently declines resulting in a decrease in volatility in a  $\text{Cr}_2\text{O}_3$ - $\text{Li}_2\text{O}$ - $\text{MgO}$  system.  $\text{Bi}_2\text{O}_3$  and  $\text{Li}_2\text{O}$  increase the volatility of alloyed  $\text{Cr}_2\text{O}_3$  while other tested compounds reduce it. Figure 1; references 3: 2 Russian, 1 Western.  
[312-12131]

UDC 542.973

#### CONDITIONS FOR PRODUCING IRON-ANTIMONY CATALYST

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 55, No 7, Jul 82  
(manuscript received 4 Oct 80) pp 1500-1505

SERGUN'KIN, V. N., PUGACHEV, Yu. V. and POPOV, I. G., All-Union Scientific Research Institute of Reagents and Chemically Pure Materials for Electronic Technology

[Abstract] The title catalyst, a solid solution of  $\text{FeSbO}_4$  with a semiequimolar excess of antimony (5+) oxide, used in the form of 80-160 mcm particles in oxidative ammonolysis of propylene, has been produced by methods such as

mixing followed by filtration, thermal processing and pulverization. Tests were made of a process based on obtaining iron stibiate in an aqueous medium through reaction of hydroxyantimonic acid that iron (3+) hydroxide, followed by drying in a spray dryer. Conditions for production, effect of suspension concentration on granular size and powder durability were assessed as well as the catalytic properties of the final product. Time for reaction was 30 minutes at 98° C, and mole ratio was 1 : 2 of iron hydroxide and hydroxyantimonic acid, respectively. Data showed that the proposed method yielded highly durable particles of the desired sizes. The iron-antimony catalyst had higher activity than bismuth-molybdenum catalysts, was more productive and showed similar effectiveness. Thus it can replace the expensive, imported bismuth-molybdenum catalyst. Figures 5; references 7: 3 Russian, 4 Western (US patents).  
[312-12131]

## CHEMICAL INDUSTRY

### SUPPLY DELAYS

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 4 Aug 82 p 1

[Article by N. Talalay, Cherkassy: "Suppliers are in no hurry"]

[Text] The collective of the Cherkasskhimstroy association (P. Shevchenko, manager) and its permanent subcontracting organizations worked in harmony for many years. They were, as the saying goes, 'on the horse'. The 'Ammiak 220', 'Ammiak 450', 'Karbamid 330' and other large plants in the 'Azot' manufacturing association were put into operation on time, and often with significant lead time.

It should have continued that way. Today, however, the work of the chemical plant builders cannot be recognized. They are being criticized at all levels. I should think so! Only 78% of the chemical plant construction plan for the first six months has been completed. What is the reason for this?

The caprolactam input complex is having problems with material and equipment deliveries. For example, the Volgograd, Chelyabinsk and Kommunarsk metallurgical plants underproduced 300 tons of high-alloy sheet steel for construction in the first six months.

That does not seem to be that much. But who gets what? The sheet steel at 'Azot' was to be used to produce 72 units of non-standard equipment. Thirty-nine units of this equipment were underproduced by the Tuymazy (Bashkir ASSR), Borisoglebsk (Voronezh Oblast) and Pavlograd (Dnepropetrovsk Oblast) chemical machine construction plants. Because they were short these units, other equipment is lying around the warehouse unable to be assembled.

The situation is aggravated by the fact that certain plants deliver unconditioned equipment. Borisoglebsk, for example, shipped out 62 devices in which the connecting joints are not shown in the overall assembly diagram. A dispute arose meanwhile between the manufacturing plant and the designers at GIAP (State Scientific Research and Planning Institute of the Nitrogen Industry and Products of Organic Synthesis), and the customer himself had to alter the equipment just to keep things moving.

The Borisoglebsk plant is not alone. 'Khim mash' in Ruzayevka shipped the completely wrong equipment which was not ordered. The 'Azot' association, of course, filed a claim. "Send back the equipment", they wired from Ruzayevka.

The customer shipped out the unneeded equipment and asked them to quickly ship the device which the designer needed.

"No" they wired from Ruzayevka's 'Khimash' plant, signed by comrade Klyuchnikov. "You were too late in filing a claim. Re-order and we'll fill it in 1983".

Here you have it: they allowed the oversight, but they are in no rush to rectify it.

Among the construction debtors are the Kurgan reinforcement plant and the Pervouralsk new pipe plant, and the UkSSR Ministry of Assembly and Special Construction's Nikolayev, Zhitomir, Kharkov and Kramatorsk metal construction plants.

Things can not be connected up during construction. The lack of heat exchangers, stacks, pipes, reinforcement and other equipment prevents them from assembling the joints. Selective assembly has sharply reduced the labor productivity of the assemblers and has increased the volume of labor.

Almost no work is being done on a very important facility--the fire extinguishing system--by the 'Ukryugspetsavtomatika' branch of the Ministry of Instrument Construction (I. Dem'yanenko, administrative head). Only four men have been put on the job instead of 30 as planned.

Steps are being taken to eliminate the delay. Headquarters have been set up at various levels. Construction is being supervised by the Cherkassy party obkom office. Equipment and metal structure suppliers must be made more responsible for the start-up of major construction.

8617  
CSO: 1841/315

## BRIEFS

**LAGGING FACTORIES NAMED**--The Shebekino biochemical plant was built in the Belgorod Oblast several years ago. It produces fodder lysine, an extremely valuable product which helps to increase animal weight gain by 15 to 20%. However, though lysine is in short supply, the enterprise did not meet the state target. Why? The plant was designed and built to use a raw material (maize extract) which is in short supply in the country, even for medical needs. They began looking for a substitute. The question remains unanswered. Capricious and unreliable equipment and the lack of a reliable raw material supply resulted in the enterprise's operating at only 60 to 70% of capacity. Instead of solving the problem at the grass-roots, Glavmikrobioprom (Administration of Microbiologicals) just replaced the enterprise's managers. That has not improved the state of affairs. The plant is still lagging. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 13 Aug 82 p 3] 8617

**HALOGEN PRODUCTION**--The industrial capacities of the iodine and bromine plant will be greatly expanded in the current five-year plan. A complex for producing a new plant product--tetrabromine--will be built and brought up to capacity. Plant personnel and the scientists of the Turkmen Academy of Sciences' Institute of Chemistry are doing great work. Specifically, laboratory investigations are being carried out to extract other valuable chemical elements from iodine-and-bromine waters. The output of the plant's traditional products, iodine and bromine, will be also increased. Production will increase nearly 13% this year alone. By the end of the five-year plan, twice as much iodine and bromine will begin to be produced. Now over 60% of the plant's products are shipped out with the State Seal of Quality, which significantly exceeds the plan. After iodine and bromine production has been expanded and the tetrabromine complex has been brought on stream, the plant will be one of the country's largest enterprises in this sector of the economy. [By K. Sarkisyan, director of Nebit-Dag Iodine Plant] [Text] [Ashkhabad TURKMENSKAYA ISKRA in Russian 21 Jul 82 p 4] 8617

**RUBBER PRODUCTS**--Baku--The product line of Azerbaijan's flagship of large-scale chemistry, the Sumgait synthetic rubber plant, will soon be greatly expanded. This will take place after a large ethylene and propylene production facility has been put into operation. The great success in erecting this important facility was achieved by an integral team of the First Trust of the Ministry of Industrial Construction of the Republic, headed by Idris Dadashev. Having fulfilled over a million rubles worth of work, the team reported the ahead-of-schedule completion of two-fifths of its five-year plan. In honor of the

USSR jubilee, the team promised to perform 300,000 rubles worth of work over and above the plan. The 11th Five-Year Plan quota, as before, will be completed within 3.5 years. [By N. Zorin] [Text] [Moscow SOTSIALISTICHSKAYA INDUSTRIYA in Russian 13 Aug 82 p 4] 8617

UDC 661.725.4"71"

CURRENT STATUS AND PROSPECTS FOR DEVELOPMENT OF BUTYL ALCOHOLS PRODUCTION

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 7, Jul 82 pp 400-401

KATSNEL'SON, M. G. and KOLESOV, M. L.

[Abstract] Growth in production of butyl alcohols--which are extensively used in industry--abundant available and cheap raw materials and on growing demand. Methods of production include oxosynthesis, accounting for about 70%, acetaldehyde condensation and fermentation, and as a byproduct in synthesis of divinyl at rubber factories. Recent successes in oxosynthesis have given that method preference over acetaldehyde condensation. An even sharper economic difference is seen in comparing fermentation methods and the cheaper oxosynthesis. In 1979 a major plant for producing butyl alcohols and 2-ethylhexanol using an evaporative oxosynthesis procedure went onstream, further emphasizing that method of production. More projects are intended for completion in the 1981-1985 plan period, and other facilities will be renovated for modern production. Increased production of isobutanol--from readily available isobutyric aldehyde--has posed the problem of finding ways to use the isobutanol for various purposes, and of organizing new production based on isobutyric aldehyde. References 6 (Russian).  
[308-12131]

UDC 622.364.002.612.003.121

COMPREHENSIVE EVALUATION OF CONSUMER PROPERTIES OF PHOSPHATE ORE

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 7, Jul 82 pp 404-406

ANDREYEV, M. V.

[Abstract] Alongside broad use of rich Khibinskiy apatite concentrate, wider use is being made of phosphorites of the Karatau basin and the Kingisepp deposits. Both high phosphorus content and low levels of impurities such as sesquioxides, magnesium oxide and carbon dioxide are desirable properties for ore exploitation. Use of sulfuric acid to decompose and purify phosphates is



directly related to content of calcium, iron, aluminum and magnesium oxides. Analysis of chemical and technological parameters of various phosphates currently being made into mineral fertilizers indicate that the Khibinskiy apatite concentrate will continue to be the best domestic phosphate raw material. That ore compares favorably with others, with a value of one given to Khibinskiy ore and all others receiving lower values (to 0.54), in terms of their economy of production. These calculations can be used in making rational decisions on use of various phosphorite and apatite deposits for mineral fertilizer production. Figures 3; references 2 (Russian).  
[308-12131]

UDC 661.634.2

#### PRODUCING EXTRACTION PHOSPHORIC ACID AND AMMOPHOS FROM TOOLSE PHOSPHORITE CONCENTRATES OF VARIOUS ENRICHMENT LEVELS

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 7, Jul 82 pp 406-408

AASAMYAE, E. E. and VEYDERMA, M. A.

[Abstract] Continuing previous work on producing extraction phosphoric acid (EPA), double superphosphate and complex fertilizers from phosphorite concentrates from the Toolse deposits, the authors studied the possibility of using ores with lower  $P_2O_5$  content, and effects of enrichment and fineness on processing. Four samples obtained by cation and anion flotation and two pulverized samples were tested, with a cyclic method used to produce EPA. Results indicate in particular the dependence of relative filtration productivity on the degree of enrichment. Pulverization reduced filtration productivity sharply. Improved filtration of phosphogypsum with reduced  $P_2O_5$  content was attributed to increased insoluble residue, formation of more homogeneous crystals, and reduced acid viscosity. The successful test produced EPA and standard ammophos with 22-24%  $P_2O_5$  and ratios of  $Fe_2O_3$  to  $P_2O_5$  up to 8% and  $MgO$  to  $P_2O_5$  up to 12%. Several negative aspects of using this ore included increased mass per unit of  $P_2O_5$ , increased use of heat and reduced extractor productivity. Figures 2; references 5 (Russian).  
[308-12131]

UDC 66.02+531.232:621.825

#### MAGNETIC CIRCULATING SYSTEMS

Moscow KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE in Russian No 8, Aug 82 pp 8-9

SIGOV, I. V. and KODRASHOV, Yu. D., candidates of technical sciences, VERUGA, V. F. and KRUT'KO, A. A., engineers

[Abstract] To deal with the complex problem of hermetization in reaction vessels with toxic, explosive and inflammable potential, the authors developed

and implemented the circulating system described and diagrammed here. Developed at the Ukrainian Scientific Research Institute for Chemical Machinery and produced at the Starorusskiy Plant for Chemical Machinery, it features inclined belt or gear transmission with an electric motor, and magnetic clutch with concentric components sealed by nonmagnetic shields. It is intended for use in producing paranitroaniline and paraphenetidine eyes and sebacic acid, and can be modified to offer two speeds. Its economic advantages are longer dependable operation and electrical energy savings. Figures 2.  
[321-12131]

UDC 621.592.3.001.5

#### RESULTS OF DEVELOPING LOW CONSUMPTION TURBINE COMPRESSORS

Moscow KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE in Russian No 8, Aug 82  
pp 14-16

ARDASHEV, V. I. and BABICHEV, M. S. candidates of technical sciences

[Abstract] To resolve problems of insufficient dependability of high-speed bearings and complex technology for working parts and control mechanism of miniaturized components, the authors developed radial axle centripetal turbine compressors with the features of prevention of contamination by lubricants, low-temperature efficiency, relative simplicity of design and ease of operation. Since gas supported bearings were rejected at the beginning of development, various static bearings with nozzle balancing were used. The rotor (illustrated), which has radial axle curved blades, is the heart of the device. Both a single and double-stage version were produced, with the latter showing higher efficiency by 6%. Increasing rotor speed by 25-30% was found to increase efficiency by 5-7%; smaller versions lost efficiency through added friction. Study of functioning showed that efficiency of the heat-insulating machine was dependent primarily on the coefficient of revolution speed. Calculations of two-phase operation and experimental data indicated that helium and hydrogen condensation during supercooling was less by a factor of one or two than for air. The machines tested were inoperative only when liquid entered the turbine compressors along with vapor, or when liquid condensed on cold surfaces of the control mechanism. Figures 2; references 7 (Russian).  
[321-12131]

## ANALYSIS OF OPERATION OF MODERNIZED IMPACT SPRAY TRAPS

Moscow KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE in Russian No 8, Aug 82  
pp 19-20

MOROSHKIN, M. Ya., candidate of technical sciences, and SMOLIN, V. N.,  
engineer

[Abstract] Impact spray traps used in biotechnology and other branches of the economy to separate two-phase mixtures frequently perform their task unsatisfactorily, leaving impurities. The authors describe modernized devices developed at the Grozno Petroleum Institute imeni Academician M. D. Millionshchikov, and present calculations to show their advantages. Their effectiveness has been demonstrated in production tests, where they have speeded separation of mixtures and improved the purity of the components at all rates of operation, increasing productivity 1.4-fold. Figures 1; references 5 (Russian).  
[321-12131]

## AROMATIC HYDROCARBON PRODUCTION COMPLEX ON STREAM AT NOVOPOLOTSKIY PETROLEUM PROCESSING PLANT IN PRODUCTION

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 8, Aug 82 pp 5-7

RUDKOVSKIY, A. D., TETERUK, V. G., CHESNOVITSKIY, K. G., KOROLEVA, M. I. and SULIMOV, A. D., Novopolotskiy Petroleum Plant, All-Union Scientific Research and Planning Institute for Petroleum, All-Union Scientific Research Institute for Petroleum Processing

[Abstract] Technical xylene and C<sub>9</sub> aromatic hydrocarbons are produced by catalytic reforming and extraction using diethyleneglycol. New installations at the Novopolotskiy Plant are producing ethylbenzene, pseudocumene and o-xylene by rectification and low temperature crystallization, with xylenes being isolated to effect supplementary production of n- and o-xylenes. The apparatus is diagrammed and described. Xylene isomerization involves a modified alumosilicate catalyst at atmospheric pressure and temperatures of 425-450°C. Isomerization and oxidation catalyst regeneration take place in parallel reactors. A two-stage low-temperature crystallization process is used to produce n-xylene. The new processing equipment made it possible to convert 76.9% of processed technical xylene into the desired products. Figures 4; references 5 (Russian).  
[322-12131]

ANTIWEAR PROPERTIES OF ADDITIVES BASED ON HIGHER FATTY ACIDS

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 8, Aug 82 pp 16-17

LYKOV, O. P., VISHNYAKOVA, T. P., SASHEVSKIY, V. V. and ZATSEVA, L. S.,  
Moscow Order of Labor Red Banner Institute of Petrochemical and Gas Production imeni Academician I. M. Gubkin

[Abstract] Soviet synthetic fatty acids with high antiwear properties contain normal structure carboxylic acids and significant amounts of isomorphous acids, high-unsaturated and dicarboxylic acids. The authors studied these acids and other residual acids to determine their precise antiwear properties. The antiwear effectiveness of the tested compounds were ranked, with isomono-carboxylic and unsaturated acids and oxy- and ketoacids showing the best results, followed by naphthenic acids, normal carboxylic acids and dicarboxylic acids. Figures 3; references 5 (Russian).

[322-12131]

RESISTOMETRIC METHOD OF EVALUATING CORROSIVENESS OF MOTOR OILS IN ENGINES

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 8, Aug 82 pp 31-33

DEMCHENKO, V. S., LEVIN, Ye. D., DERYABIN, A. A., KIRPUN, V. I. and  
YUDOVICH, Ye. Ye., Leningrad Special Design Bureau of the Scientific Production Association "Neftekhimavtomatika"

[Abstract] Modern laboratory methods of evaluating corrosiveness of motor oils do not duplicate operating conditions well. Therefore, the authors developed a method for such measurements using a resistometric method based on measuring electrical resistance as affected by corrosion products. The device developed could be re-used after removal of corroded metal residue by acid. A chrome-nickel steel strip coated with lead in a boron-hydrogen fluoride electrolyte was used as the test material. Due to lower electrical conductivity compared to the metal, the coating's formation had no practical effect on corrosion measurements. Motor tests using Petter AV-1 and Petter W-1 engines on test stands showed that the results with this method were as reliable as other methods and could be performed under working conditions. Figures 2; references 6: 4 Russian, 2 Western.

[322-12131]

## THERMOOXIDATIONAL STABILITY OF OILS UNDER OPERATING CONDITIONS

Moscow KHIMIYA I TEKHNLOGIYA TOPLIV I MASEL in Russian No 8, Aug 82 pp 33-35

ZALOGINA, K. P., LONMZ [expansion unknown] imeni S. Shaumyan

[Abstract] Use of lubricating oils at high temperatures is frequently limited by their tendency to form carbon deposits on heated parts. Both operating conditions and chemical composition of oils and additives contribute to this problem; the author studied the effectiveness of the "PVL-2" device built at his institute for measuring friction in test lubricants at temperatures up to 300°C. The device, consisting of ringed, grooved plates with clutches for varying pressure, is described. The evaluating criterion is duration of effective functioning of the oil being tested at a given temperature. Typical axle, industrial and aviation oils were tested. As other tests had shown, light oils quickly vaporized but left less residue than slower-vaporizing fractions of heavier composition. Synthetic paraoxydiphenylamide and captax oils were tested at their normal operating temperature of 150° C. The latter did not affect the rate of vaporization but reduced deposits, while the former had favorable effects on both parameters. Data indicated that this testing method can be used for quick and accurate testing of synthetic oil properties. Figures 4; references 1 (Russian).  
[322-12131]

## ANTIOXIDATION ADDITIVES TO SYNTHETIC OILS

Moscow KHIMIYA I TEKHNLOGIYA TOPLIV I MASEL in Russian No 8, Aug 82  
pp 40-42

KULIYEVA, Kh. N. and SMOLENKOVA, V. S., Institute of Chemical Production,  
AzSSR Academy of Sciences

[Abstract] The authors review research on synthesis and use of the most common antioxidants for synthetic oils both in the USSR and abroad in recent years. They find that most of the articles on high-temperatures antioxidants have been published in the Soviet Union, while foreign research has been directed at new synthetic lubricants that contain antioxidants. They discuss succinimide compounds with both nitrogen and sulfur, alkyl derivatives of phenothiazine, aromatic amines among which the best results have been obtained with N-(2,5di-tert-heptyl-4-oxyphenyl) naphthylamine, azomethines, various phosphorus- and nitrogen-containing additives, and antioxidants containing metals. Stabilization under ultraviolet radiation has been achieved with alkaline and transitional metals and thio-bisalkylphenols. Mixtures of aromatic amines with salts and hydroxides of metals with constant valence

have resulted in synergic antioxidative action. Esters of pentaerythrite and monocarboxylic acids have been used for aviation gas-turbine engines. Soviet research on such additives continues at a high level of intensity. References 21: 14 Russian, 1 Czech, 6 English.  
[322-12131]

## FERTILIZERS

### INTERVIEW WITH MINISTER OF FERTILIZER PRODUCTION, ALEKSEY GEORGIYEVICH PETRISHCHEV

Moscow EKONOMICHESKAYA GAZETA in Russian No 28, Jul 82 p 2

/Interview with A. G. Petrishchev, minister of mineral fertilizer production:  
"Development of mineral fertilizer production"/

/Text/ "Aleksey Georgiyevich, what contribution is to be made by the labor teams of your sector to the implementation of the Food Supply Program?"

"The mineral fertilizer production industry has been given first priority in tackling the Food Supply Program. It is to provide delivery to agriculture (converting to 100 percent nutritive substance) 26,500,000 tons of mineral fertilizer in 1985 and 30,000,000 to 32,000,000 tons in 1990; 950,000 and 1,200,000 tons of mineral feed additives, respectively; and 680,000 tons and 750,000 to 790,000 tons of plant protection chemicals, respectively.

"The assignments are intensive, but real. With all its previous efforts, especially since the March (1965) plenum of the CPSU Central Committee, the party has led the Soviet people to establish and develop a reliable material base for the fertilizer industry. May I remind you that in 1965, converting to 100 percent food substance, the country produced only 7,400,000 tons of mineral fertilizer, while in 1981 there were 26,000,000 tons produced, more than three times as much. We must now reach new heights."

"The Food Supply Program has given great assignments to increase mineral fertilizer quality. What is being done along these lines?"

"The labor teams in the sector are devoting a great deal of attention to increasing the quality of mineral fertilizers. Nearly all the growth in mineral fertilizer production has been achieved by increasing the output of compound and concentrated mineral fertilizers. This has enabled us to increase the content of nutritive substance in mineral fertilizer from 29.4 percent in 1970 to 39.7 percent in 1981. To improve the shelf life of mineral fertilizer and reduce losses, we widely introduced the progressive method of bulk shipping mineral fertilizer in specialized automatic dump cars. Already 1/5 of all mineral fertilizers has been shipped by this method in 1981.

"At the recent expanded session of the college of ministers and presidium of the central committee of the trade union of workers of the chemical and petrochemical industry, where sector team assignments in implementing the

resolutions of the May plenum of the CPSU Central Committee were discussed, the matter of increasing product quality was examined from all points of view.

"What are our plans?

"Production of highly-concentrated compound fertilizers in 1990 should constitute at least 90 percent of the total output. By 1988 we must meet all rural needs for mineral fertilizers only in granulated or coarse-crystalline form.

"All growth in plant protection chemical production will be accomplished by creating modern highly efficient compounds. This will fully satisfy all agricultural requirements for herbicides."

"What steps are to be taken to develop the sector's material base?"

"Before citing specific figures, I want to recall the attention and assistance that we continuously received from the CPSU Central Committee and USSR Council of Ministers. Already for the third five-year plan in a row, matters of development of the sector have been covered in special resolutions of the party and government. Even the formation of our ministry is testimony to the exceptional value that the party and government have placed on the development of the mineral fertilizers industry.

"In a speech delivered to the May plenum of the CPSU Central Committee, comrade L. I. Brezhnev noted that the Food Supply Program is promoting tasks of different terms: long-term, medium term and immediate. The latter are now the focus of our concern.

"Very important, without doubt, is the execution of capital construction plans. In accordance with the five-year plan, the sector is to cope with considerable capital investments, put into operation more than 150 complexes to produce 8,000,000 tons of mineral fertilizers, 6,100,000 tons of ammonia, 4,200,000 tons of sulfuric acid and 2,000,000 tons of sulfur.

"The builders and workers of our sector are competing for the successful execution of the 11th Five-Year Plan. Things have been well arranged at several facilities. Dozens of shops, aggregates and production operations have been put into operation and are already producing. But some facilities have permitted serious delays.

"In 1981 capacities were not put into operation to produce ammonia in Togliatti and Fergan, mineral fertilizers in Kemerovo, Novgorod, Cherepovets, Berezniki and at some other enterprises. It is also disturbing that the industrial construction and assembly work plan for the first half of 1982 has been underexecuted.

"Many start-up and started projects have allowed significant delays in carrying out construction and assembly work, including such important construction projects as ammonia production in Togliatti, liquid compound fertilizers in Yefremovo, potassium fertilizers at the Novosolikamsk potassium plant, potassium nitrate at the Bereznikovo industrial association "Azot". Construction



of the Dorogobuga nitrogen fertilizer plant is extremely unsatisfactory.

"But the builders are not the only guilty ones. As the purchaser, our ministry bears a large share of the responsibility. For example, we did not see that equipment was delivered on time in 1981 for phosphorus production to the Novo-Dzhambul plant, and for ammonia production in Fergan and Togliatti."

"What is being done to overcome the lag in facility construction?"

"The situation in construction and starting up capacities in the sector is of serious concern to the CPSU Central Committee. In March 1982, this issue was the subject of a special hearing. Ministry efforts in constructing mineral fertilizer production plants were rated as unsatisfactory.

"In implementing the resolution of the CPSU Central Committee, the dynamics of construction of major facilities were discussed at joint board meetings of the Ministry of Fertilizers, USSR Ministry of Industrial Construction, USSR Ministry of Construction, USSR Ministry of Heavy Construction, USSR Ministry of Assembly and Special Construction, with the participation of managers from the larger construction projects. Measures to radically improve the situation in capital construction were outlined and coordinated with the construction ministries.

"The ministry is taking steps to see that construction projects have all the necessary equipment, materials and budget planning documentation. Active efforts are being made to train operating personnel for start-up facilities. With on-site visits by ministry administrators, participation of republic and oblast party agencies, decisions have been made to ensure that the established assignments are fulfilled.

"The measures adopted on several large construction projects yielded positive results. In April and May, there was an increase in the construction rates of our enterprises in Krasnodar, Meleuz, Yavorov, Cherepovets, Dzhambul, Severodonetsk and some other cities. A good example was the construction of the Krasnodar chemical plant. In 1982, staff from the 'Krasnodarkhimstroy' trust of the USSR Ministry of Industrial Construction, assembly organizations, the USSR Ministry of Assembly and Special Construction, and the Krasnodar chemical plant decided, on the basis of socialist competition, to accelerate construction and to put into operation a 270,000 ton nitroammophoska production capacity ahead of schedule.

"The board of the Ministry of Fertilizers, in collaboration with the boards of construction ministries and the presidiums of the central committees of sector trade unions, approved the initiatives of the builders and this valuable undertaking is receiving all-out development.

"While examining the state of affairs with the construction ministries, we found that several construction projects did not have the required amount of construction materials, hardware and workers. The situation is now being corrected, but it is, unfortunately, too slow in many areas".

"Tell us about the sector's meeting the 1982 quota".

"Last year a pretty good foundation was laid for success in the second year of the five-year plan. Overall production output was 9.4 percent higher than 1980, profit rose 16 percent, labor productivity increased 8 percent and utilization of industrial capacities was improved. Production of mineral fertilizers saw a 6.3 percent increase, plant protection chemicals 13 percent, ammonia 7.3 percent and sulfuric acid 8.7 percent.

"The quota of marketable products for the first six months of 1982 has been filled and labor productivity targets have been surpassed. The nitrogen and phosphorus fertilizer and plant protection chemical quotas have been met. Potassium fertilizer production assignments did not reach the targeted level.

"It is worth noting that the sector's working classes successfully fulfilled their major assignment in the first six months: the delivery quota for mineral fertilizers and plant protection chemicals to rural laborers.

"There are, of course, objective reasons why the potassium fertilizer production quota was not met. But that is not the only issue.

"The following industrial associations performed unsatisfactorily in the first six months of 1982: 'Uralkaliy', 'Tol'yattiazot', the Novo-Dzhambul phosphorus plant and the Rustavi chemical plant. The unstable work of these enterprises is blamed on management deficiencies and a lack of proper responsibility for work assignments. Take the 'Uralkaliy' association, for example. In 1981, its production fell short by 830,000 tons of fertilizer. Of this, by the enterprise's own figures, deliveries were nearly 300,000 tons short because of processing malfunctions and unplanned equipment downtime. This means it was not just a matter of objective factors.

"Our primary goal is to make up for the lag tolerated in 1981 in delivering mineral fertilizers to agriculture. The reality of this problem is proven by the experience of the leading enterprises.

"In January through May 1982, Rovno's and New Moscow's industrial associations 'Azot' completely overcame the lag tolerated in 1981 and repaid their debt. By 10 Jun 82 the Cherepovets 'Ammophos' association had made up for the backlog.

"The personnel of Novogorod's 'Azot' association and Gorlovo's 'Stirol' association and the Pridonsk chemical plant are on the right track and they were able to make up for the lag in mineral fertilizer production tolerated in the first quarter of 1982".

"Economizing of raw materials and supplies has become extremely important. What is being done along these lines?"

"After publication of the famous CPSU Central Committee and USSR Council of Minister's resolution on this issue, the teams of the sector set up a competition to save and economize. A good example is given by the collectives of the 'Apatit' industrial association, the Voskresensk 'Minudobreniya' and 'Beloruskaliy' associations. Standards for consumption of raw materials and

supplies are being re-examined and tightened.

"We must realize, however, that we are not doing everything that needs to be done and that overconsumption of raw materials is still taking place at some sector enterprises.

"The economical use of natural gas is important. Nevertheless, the ministry's enterprises overconsumed 150,000 cubic meters of gas within five months in 1982.

"Actual consumption of gas at similar ammonia production plants differs greatly. At Grodno's 'Azot' industrial association, gas consumption per ton of ammonia was 1,260 cubic meters, while at a similar facility in Cherkassy some 1,323 cubic meters were expended. This is not an isolated fact. Similar examples can be given for carbamide, sulfuric acid and sulfur production.

"We must speak of the need to accelerate the assimilation of capacities. There are examples of industrial capacities being assimilated ahead of schedule. In 1982, the 'Tol'yattiazot' industrial association brought an ammonia plant to full capacity in three months, and the Pridonsk plant in 6 months, instead of the 12 months prescribed in the standards.

"But things are not working out well everywhere: at the same 'Tol'yattiazot' association, all periods for assimilation of capacities have been violated at four ammonium plants. Nitric acid, ammonium phosphate and ammonia facilities at the Rustavi chemical plant are being unsatisfactorily assimilated. They have yet to bring to planned capacity the production of double superphosphate in Balakovo and Uvarovo.

"The ministry's board is examining the state of affairs at practically every enterprise and is directing team efforts for maximum utilization of internal reserves.

"Decisions of the May plenum of the CPSU Central Committee were received with inspiration by the work crews. Over a half million workers, technical and engineering staff, clerks, scientists and specialists, and hundreds of industrial enterprises, plants, shops and crews involved in the production of mineral fertilizers have established a socialist competition to meet and surpass 1982's planned targets and socialist obligations and the 11th Five-Year Plan as a whole.

8617

CSO: 1841/314

UDC 547.461.2+543.817

BASIC PHYSICOCHEMICAL PROPERTIES OF OXAMIDE AND DERIVED GRANULATED FERTILIZERS

Kiev KHIMICHESKAYA TEKHNLOGIYA in Russian No 4, Jul-Aug 82  
(manuscript received 12 Mar 82) pp 3-6

PARKHOMENKO, V. D., PIVOVAROV, A. A., STEBA, V. K. and OBRAZTSOV, A. E.

[Abstract] Promising slow-acting fertilizers include  $(\text{CONH}_2)_2$ , the diamide of oxalic acid also known as oxamide. Its application as a powder, however, is ineffective and further complicated by losses to microorganisms. To improve it, the authors studied more effective means of granulation, properties of the oxamide and of binding agents, and other factors. Thermogravimetric studies showed that, above  $260^\circ\text{C}$ , oxamide began to sublime, reaching a maximum at  $340^\circ\text{C}$ ; this precludes smelting methods of granulation. Other approaches were addition of sulfite-distillery grain concentrate (SDGC), and use of superphosphates. Preliminary studies showed that the SDGC combined with oxamide inhibited nitrification, and further studies were conducted in two directions by forming oxamide tablets with added SDGC or superphosphate, or by granulating oxamide by a sluicing method. The SDGC was found to have superior binding properties and to have lower hygroscopicity than current production fertilizers. Compression and sluicing methods offer promising results in producing slow release fertilizers of oxamide and sulfite-distillery grain concentrate. Figures 7; references 8: 3 Russian, 5 Western.  
[316-12131]

UDC 539.217.3:546.32'13-492.3

INCREASING MOISTURE RESISTANCE OF GRANULATED POTASSIUM CHLORIDE

Kiev KHIMICHESKAYA TEKHNLOGIYA in Russian No 4, Jul-Aug 82

KUZNETSOV, F. M., SOKOLOV, I. D., VOLKOV, V. A. and ZAGIDULLIN, S. Kh.,  
All-Union Scientific Research Institute of Halurgy

[Abstract] The amount of residual moisture has a determining role in granule durability of mineral fertilizers, and reduction of hygroscopicity is a basic

yet difficult step for improving durability. The authors review various means of dry pressing that are aimed at achieving this end. Methods include compression into a monolithic state, addition of hydrophobic additives such as mineral oils, and surface processing. The results of these processes, whose products were examined under microscope, showed that the durability of mineral fertilizers can be increased directly by compression to a porosity of no more than 2%, but such pressing is technically difficult and expensive. High temperature pressing with mineral oil treatment was found to be an effective way to increase moisture resistance, and the best source compounds were a solution of phosphate and ammonium nitrate. Figures 4; references 6 (Russian). [316-12131]

## ION EXCHANGE PHENOMENA

UDC 621.359.7

### COMPETITIVE TRANSFER OF $\text{Cl}^-$ AND $\text{SO}_4^{2-}$ ACROSS MA-40 AND MGA-95 MEMBRANES

Kiev KHIMIYA I TEKHOLOGIYA VODY in Russian Vol 4, No 4, Jul-Aug 82  
(manuscript received 9 Jul 81) pp 349-352

PONOMAREV, M. I., CHEBOTAREVA, R. D., and GREBENYUK, V. D., Institute of Colloid Chemistry and Water Chemistry imeni A. V. Dumanskiy, Ukrainian SSR Academy of Sciences, Kiev

[Abstract] The efficiency of the MA-40 membrane in electrodialytic separation of  $\text{Cl}^-$  and  $\text{SO}_4^{2-}$  anions was markedly improved by lining it with the acetyl-cellulose membrane MGA-95, with the coarse-pore lining of MGA-95 facing MA-40. In a system employing NaCl and  $\text{NaSO}_4$  at a concentration of 0.3 g-eq/L each and a current of 7 mA/cm<sup>2</sup> the ratio of  $\text{SO}_4^{2-}$ : $\text{Cl}^-$  transfer across the membrane was 1:13. MGA-95 was less effective in hindering  $\text{SO}_4^{2-}$  flow when its active surface was facing MA-40. Figures 5; references 5 (Russian).  
[330-12172]

## NITROGEN COMPOUNDS

UDC 547.7/8

### REACTIONS OF HETEROAROMATIC COMPOUNDS WITH CARBENES (SURVEY)

Riga KHIMIYA GETEROTSIKLICHESKIKH SOYEDINENIY in Russian No 6, Jun 82  
(manuscript received 6 Jan 81) pp 723-743

VASIL'VITSKIY, A. Ye., SHOSTAKOVSKIY, V. M. and NEFEDOV, O. M., Institute of Organic Chemistry imeni N. D. Zelinskiy, USSR Academy of Sciences, Moscow

[Abstract] Intensive development of carbene chemistry has evolved through expanding the range of reactions of carbenes with various classes of organic compounds, including heterocyclic types that have not been included in previous reviews of the literature. The authors review those developments, including cyclic compound reactions at short bonds and their inclusion in ordinary chemical bonds, singlet carbene attachment to double bonds in a single-stage process passing through an asymmetrical transitional state and carbene-olefin bonds where stabilizing substituents such as alkalis, arsenic, chloride and the like increase, and destabilizers (COR, COOR, or NO<sub>2</sub>) decrease olefin activity. A section of the review is devoted to reactions of five-member heterocycles with carbenes generated from aliphatic diazo-compounds (e.g., furan and derivatives and various thiophenes), where anomalies in the reactions apparently are tied to the triplet state of the reacting carbene or the fact that the electron acceptor substituent at the nitrogen atom dearomatizes the charged  $\pi$ -system of the pyrrole nucleus causing the latter to react like an ordinary diene. Another section presents research on reactions of five-member heterocycles with halogen carbenes, in which the means of generation has a distinct effect on the direction, structure and yields of final products. The basic direction is attachment at the double bond of heterocyclic nuclei bringing formation of bicyclic adducts. Finally, six-member heterocycles reacting with carbenes from diazo-compounds are discussed. Due to lesser aromatic features, in contrast to benzoydes, these compounds can react with carbenes with lower electrophilicity. References 105: 21 Russian, 84 Western. [305-12131]

## SYNTHESIS OF MERCAPTONITROIMIDAZOLES AND THEIR REACTIONS WITH 2,4,6-TRINITRO-CHLOROBENZENE

Riga KHIMIYA GETEROTSIKLICHESKIKH SOYEDINENIY in Russian No 6, Jun 82  
(manuscript first received 18 Jun 80, in revised form 11 May 81) pp 812-816

NURGATIN, V. V., SHARNIN, G. P., NURGATINA, R. B. and GINZBURG, B. M., Central Scientific Research Institute of Scientific and Technical Information and Technical Economic Investigations, Moscow

[Abstract] The best described syntheses of mercaptoimidazoles cover their derivatives with alkyl substituents at position 1. The present study sought to develop methods to obtain such derivatives with substitution at other than the pyrrole nitrogen atom. The title reaction was chosen as the model. The reaction of 2-iodo-4(5)-nitro- and 4(5)-chloro-5(4)-nitroimidazoles with potassium sulfide provided good yields of dipotassium salts of corresponding mercaptonitroimidazoles, while the reaction of 2-chloro-4(5)-nitroimidazole with potassium sulfide, independent of the ratio of reagents, brought a single product, a dipotassium salt of 4(5)-4'(5')-dinitrodiimidazolylsulfide-2,2'. Processing these salts with strong acids brought satisfactory yields of free mercaptonitroimidazoles. Of the two nucleophile S and N centers in these compounds, the S-center was the most reactive. Increasing the quantity of the nitro group brought a loss of nucleophile activity by the "pyrrole" nitrogen in the model reaction. Chemical procedures are given in the experimental section. References 7: 3 Russian, 4 Western.  
[305-12131]

## OXIDATION OF HYDRAZINE IN NITRIC ACID SOLUTIONS IN PRESENCE OF TECHNETIUM

Leningrad RADIOKHIMIYA in Russian Vol 24, No 4, Jul-Aug 82  
(manuscript received 13 Nov 81) pp 529-532

AKOPOV, G. A., KRINITSYN, A. P. and TSARENKO, A. F.

[Abstract] Hydrazine oxidation was studied under conditions approximating those employed in plutonium recovery, i.e., at 45°C in nitric acid solutions in the presence of technetium, which resulted in the formation of nitrogen, ammonia, and hydrazoic acid (eventually oxidized to nitrogen). Reaction of the hydrazoic acid with Fe(III) ions results in the formation of a colored complex with a maximum adsorption at 460 nm. Evaluation of hydrazine oxidation kinetics showed that the reaction is limited by the nitric acid oxidation of reduced technetium and that technetium functions as a catalyst. At 25.5°C and in the presence of less than 2 M HNO<sub>3</sub> stability of Pu(III) and Fe(II) is predicated on the presence of hydrazine. Figures 3; references 8: 7 Russian, 1 Western.  
[333-12172]



## ORGANOMETALLIC COMPOUNDS

UDC 547.242+546.19

### REACTION OF HIGHER ALCOHOLS WITH ARSENIC TRIOXIDE

Tbilisi SOOBASHCHENIYA AKADEMII NAUK GRUZINSKOY SSR in Russian Vol 105, No 2, Feb 82 (manuscript received 7 May 81) pp 301-304

INDZHIYA, M. A., GIGURI, N. Sh., GIGURI, R. D., CURGENISHVILI, L. V. and VARADASHVILI, A. Sh., Tbilisi State University

[Abstract] Recent years have seen wide use of trialkylarsenites as initial materials for producing tertiary arsines, metallic arsenic of high purity and arsenic trioxide(ATO). As a result, new efficient means to synthesize trialkylarsenites have become of great importance. To improve on the standard reaction of ATO with alcohols, which is shifted "to the right" by anhydrous copper sulfate or calcium carbide in a 1.5-2 excess of alcohol, the authors sought to synthesize esters of arsenous acid without an additional reagent. Higher alcohols were found to react with ATO without drying agents to form high yields of trialkylarsenites if the water that separates from the reaction is removed. Only a 10% excess of alcohol was employed, and yields were essentially the same as those obtained when n-octane was used as an azeotrope forming agent. The trialkyl arsenites obtained were purer, and yields were 77-85%. References 7: 3 Russian, 4 Western.  
[299-12131]

UDC 547.789.9'571'574.3:543.51

### MASS-SPECTRA OF DERIVATIVES OF BENZALDEHYDE SELENAZOLYLHYDRAZONES

Riga KHIMIYA GETEROTSIKLICHESKIKH SOYEDINENIY in Russian No 6, Jun 82 (manuscript received 29 Jun 81) pp 762-764

TSURKAN, A. A., LEVSHIN, I. B., ADANIN, V. M. and ZYAKUN, A. M., Ryazan Medical Institute imeni Academician I. P. Pavlov, Ryazan; Institute of Biochemistry and Physiology of Microorganisms, USSR Academy of Sciences, Pushchino-na-Oke

[Abstract] Continuing earlier research on the synthesis and analysis of derivatives of benzaldehyde heterylhydrazones, the authors studied the basic

directions of disintegration of the title compounds under electron bombardment. Analytically important derivatives of carbonyl compounds such as nitro- and particularly dinitrophenylhydrazones have been studied previously; their spectra are typical and permit determination of the position and character of substituents. Mass spectra of the compounds studied in the present work show intensive  $M^+$  peaks with high stability. Destroying the aromatic nature of the heterocycle in some products made regrouping with separation of benzonitrile from  $M^+$  less likely. Basic fragments of the mass-spectra formed as  $SeH$  and  $SeCHCO$  atom groups were expelled. References 10: 5 Russian, 5 Western.  
[305-12131]

UDC 546.171.5.271

#### MECHANICO-CHEMICAL SYNTHESIS AND PHYSICAL/CHEMICAL STUDY OF DIETHYLAMINOBORANE

Novosibirsk IZVESTIYA SIBIRSKOGO OTDELENIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKIKH NAUK in Russian No 7, Issue 3, May 82 (manuscript received 21 Sep 81) pp 45-50

VOLKOV, V. V., MYAKISHEV, K. G. and TROFIKOVA, T. N., Institute of Inorganic Chemistry, Siberian Branch, USSR Academy of Sciences, Novosibirsk

[Abstract] While nitrogen boride compounds and derivatives are used in various chemical processes, relatively little data is available on ways of obtaining and on properties of the title compound. An attempt is reported of ways to obtain it without using organic solvents, by mechanical activation of  $(C_2H_5)_2HN \cdot HCl$  with  $LiBH_4$ ,  $NaBH_4$  and  $KBH_4$ . Consideration was paid to the dependence of diethylaminoborane on the nature of the alkaline metal tetrahydroborate, the molecular ratios and the time of solution. The experimental data are compared to that reported earlier, which indicated that the reduced amount of hydrogen emitted was apparently connected to incomplete decomposition of intermediate diethylammonium tetrahydroborate. Physical chemical properties were studied using the title compound distilled at reduced pressure in a nitrogen flow. Results of chemical analysis, hydrolysis, refractometry and cryoscopy show the compound's molecular mass, the fact that with increased concentrations the degree of association increases more in benzene than in dioxane, and other properties. During storage and diethylaminoborane turned into a gel, as relative density and viscosity might project. Figures 5; references 14: 9 Russian, 5 Western.  
[306-12131]

PHYSICAL CHEMICAL STUDY OF  $\text{CaO-H}_3\text{PO}_3\text{-H AsO}_4\text{-H}_2\text{O}$  SYSTEM AT 25° C. REPORT 4

Novosibirsk IZVESTIYA SIBIRSKOGO OTDELENIYA AKADEMII NAUK SSSR: SERIYA  
KHIMICHESKIKH NAUK in Russian No 7, Issue 3, May 82 (manuscript received  
19 May 80) pp 53-59

AFANAS'YEVA, V. A., MAZUROVA, A. A. and GRANKINA, Z. A., Institute of Inorganic  
Chemistry, Siberian Branch, USSR Academy of Sciences, Novosibirsk

[Abstract] Data are presented from a cross-section of the title system with initial gram-atom ratio of  $\text{Ca} : (\text{P} + \text{As}) = 1.25$ , in a range of pH 4.55-7.35, initial  $\text{CaO}$  of 1.14 g, and initial  $\text{H}_2\text{O}$  of 100 ml. X-ray phase analysis showed the presence of four zones, with either single-or double-phase composition. The  $\text{Ca} : (\text{P} + \text{As})$  atomic ratios indicated the presence of significant acidic components, and this was confirmed by infrared spectra. Some samples that were heat-treated in ampules showed two phases, one of which was apatite, the other pyroarsenate or pyrophosphate. Other samples among the 95 tested had related structures. Solid solutions were based on "defective" apatite and  $\text{Ca}_5\text{H}_2(\text{AsO}_4)_4 \cdot 9\text{H}_2\text{O}$ , with the maximum  $\text{As} : (\text{P} + \text{As})$  ratio at about 90% atomic weight. Figures 2; references 15: 4 Russian, 11 Western.  
[306-12131]

CORRECTED STRUCTURE OF REACTION PRODUCT OF GIBBERELLIN  $\text{A}_3$  WITH ACETIC ANHYDRIDE AND ZINC AND ITS CRYSTALLINE STRUCTURE: RARE CASE OF DIELS-ALDER REACTION

Tashkent KHIMIYA PRIRODNYKH SOYEDINENIY in Russian No 3, May-Jun 82  
(manuscript received 16 Jul 81) pp 359-364

DRUGANOV, A. G., GATILOV, Yu. V. and RALDUGIN, V. A., Novosibirsk Institute  
of Organic Chemistry, Siberian Branch, USSR Academy of Sciences

[Abstract] The authors questioned the structure for the product of the title reaction reported by Jones, Grove and MacMillan (J Chem Soc, 1964), and examined spectral data in the ultraviolet spectrum and in NMR of carbon 13. From their data they conclude that the substance studied did not include the 3 $\alpha$ -methylketone group, so that the structure proposed by Jones et al is erroneous, as is that of the corresponding acid. The authors propose a revised structure that fits the spectral data. The key stage in the formation of the product from the methyl ester of the diacetate of gibberellin  $\text{A}_3$  is an internal Diels-Alder reaction between the charged diene system and the acetate carbonyl in the mixed anhydride formed from the original compound, apparently, in two stages. The structure of the compound proposed is (--) - 3 $\alpha$ -(1'-oxyethyl)-13-acetoxy-10,1'-epoxy-7-methoxycarbonyl-20-norgibberella-1,16-diene-19-ic acid of 19,1'-lactone. Chemical procedures are given in the experimental section. 4 Russian, 7 Western.  
[311-12131]

## REACTION OF MOLYBDENUM AND RHENIUM PENTACHLORIDES WITH CERTAIN SUBSTITUTED NITRILES

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 27, No 8, Aug 82  
(manuscript received 28 Jan 81) pp 2132-2135

UL'KO, N. V. and GOLOVERDA, G. Z., Kiev State University imeni T. G. Shevchenko

[Abstract] Because of growing interest in halides of transitional metals and their wide use in the synthesis of coordination compounds, the authors have studied reactions of the title compounds with trichloroacetonitrile and tert-butylcyanide. Due to the high sensitivity of these compounds to moisture and oxygen, tests were conducted in dry argon that was free of oxygen. Pure nitriles were obtained by distillation over  $P_2O_5$ . IR, EPR spectroscopy, magnetic susceptibility, and pyrolysis were employed to study the structure and properties of the produced systems  $ReCl_5-CCl_3CN$ ,  $MoCl_5-CCl_3CN$ ,  $ReCl_5-(CH_3)_3CCN$  and  $MoCl_5-(CH_3)_3CCN$ . Due to uneven crystallization, molecular mass of the first could not be determined. Cryoscopic analysis revealed the previously unreported  $(CH_3)_3CCN$  nitrile of the third and fourth systems.  $ReCl_5$  dissolved in the nitrile to form a tetravalent rhenium solvate:  $MoCl_5$  behaved in a similar fashion. References 9: 3 Russian, 6 English.  
[320-12131]

## ORGANOPHOSPHORUS COMPOUNDS

UDC 547.26'118

### PREPARATION OF PHOSPHORYLATED BENZIMIDAZOLES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 7, Jul 82  
(manuscript received 20 Oct 81) pp 1441-1454

MATEVOSYAN, G. L. and ZAVLIN, P. M., Leningrad Agricultural Institute

[Abstract] Methods of preparing the title compounds, of interest due to their high biological activity, are reviewed. One type of reaction, for example that of benzimidazoles (BIA's) with Na in  $\text{CH}_3\text{OH}$  to form the Na salt which subsequently reacts with  $\text{PClOR}_2$  via the elimination of NaCl, results in a compound having the P group on the  $\text{N}^1$  atom, e.g., the N which is single-bonded to the benzene ring. Another type of reaction requires the amination of the  $\text{C}^2$ , the C of the imidazole ring, and the subsequent replacement of the  $\text{NH}_2$  by the desired phosphorylating agent, such as  $\text{PCl}(=\text{X})\text{R}_2$  resulting in a compound having the P group on the  $\text{C}^2$  atom. Analysis of the UV spectra indicates a virtual absence on any interaction between the electronic systems of the BIA's and P moieties. This is probably due to the unshared pair of N electrons in the  $\text{pp}\pi$ -conjugation and the absence of their interactions with the vacant P orbitals. References 67: 52 Russian, 15 Western.  
[319-12027]

UDC 547.241+547.33

### REACTION OF DIPHENYLCHLOROPHOSPHINE WITH 1-NITRO-1-PROPENE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 7, Jul 82  
(manuscript received 15 Sep 81) pp 1477-1481

GAREYEV, R. D., LEVIN, Ya. A., GOL'DFARB, E. I., SHERMERGORN, I. M. and PUDOVNIK, A. N., Kazan' Veterinary Institute imeni N. E. Bauman; Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch of the USSR Academy of Sciences

[Abstract] The title reaction proceeds with the formation of a mixture of the chloroanhydride of  $\alpha$ -diphenylphosphinylpropane hydroxylic acid (I),

diphenyl- $\alpha$ -cyanoethylphosphin oxide (II), and the chloroanhydride of diphenylphosphinous acid (III). The product mixture suggests that the trivalent P reacts via the formation of a phosphorane adduct. The direction of the reaction is determined by the reactivity of the controlling substituent on the P atom and the C atom in the oxazaphospholene ring. A detailed study of the reaction of (I) with diphenylchlorophosphine indicates that this reaction proceeds via a radical mechanism. Experimental procedures and structural confirmations are listed. References 11: 10 Russian, 1 Western. [319-12027]

UDC 542.91+547.794.2'118

#### REACTION OF 2-SILYLAMINO-1,3,2-OXAZAPHOSPHOLANES WITH ALCOHOLS AND PHENOLS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 7, Jul 82  
(manuscript received 23 Oct 81) pp 1481-1487

PUDOVIK, M. A., KUBARDINA, L. K. and PUDOVIK, A. N., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch of the USSR Academy of Sciences

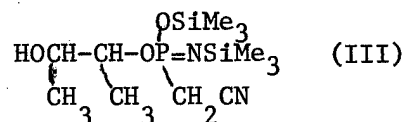
[Abstract] The title study was carried out with special emphasis on the behavior of the P-N-Si bond for the following four compounds:  
2-(N-methyl-N-trimethylsilyl)amino-3-methyl-1,3,2-oxazaphospholane (I);  
2-(N-methyl-N-trimethylsilyl)amino-3-phenyl-1,3,2-oxazaphospholane (II);  
2-(N-phenyl-N-trimethylsilyl)amino-3-phenyl-1,3,2-oxazaphospholane (III);  
and 2-(N,N-bis(trimethylsilyl)amino)-3-phenyl-1,3,2-oxazaphospholane (IV).  
I reacts easily at room temperature with PhOH (preserving the original ring structure) and with EtOH (opening the original ring). The ethanolysis of II and III is more difficult and requires either heating or a longer time. The phenolysis of III at room temperature occurs with the formation of two products: silylamidophosphite and 2-phenoxy-3-phenyl-1,3,2-oxazaphospholane. The ethanolysis of IV occurs on heating with preservation of the original ring. References 8: 6 Russian, 2 Western. [319-12027]

CYCLIC ORGANOPHOSPHORUS COMPOUNDS WITH ACTIVE METHYLENE GROUP, PART 3:  
REACTION OF SUBSTITUTED CYCLIC ESTERS AND NITRILES OF PHOSPHONOACETIC ACID  
WITH HEXAMETHYLDISILAZANE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 7, Jul 82  
(manuscript received 23 Oct 81) pp 1487-1491

OVCHINNIKOV, V. V., VALITOVA, V. M., YARKOVA, E. G., CHERKASOV, R. A. and  
PUDOVIK, A. N., Kazan' State University imeni V. I. Ul'yanov-Lenin

[Abstract] The title reaction was carried out for the two compounds 2,3-butylene-nitrile (I) and methyl- (II) ester of pyrocatechinphosphonoacetic acid with hexamethyldisilazane (HMDS) resulting in the formation of acyclic disilated derivatives. Various spectral methods were employed to confirm the structure of the reaction product of I and HMDS as the following:



Various chemical principles are invoked to explain the direction of the reaction. (III) is in equilibrium with several tautomers, including those formed by ring closure between the silated oxygen and the hydroxyl oxygen, double bond shift and exchange of the  $-\text{OSiMe}_3$  for the  $-\text{NHSiMe}_3$ . References 15: 5 Russian, 10 Western.  
[319-12027]

UDC 547.887.3

## 1,2,3,4-TETRAHYDRO-1,2,4,5-TETRAZA-3-PHOSPHORINYL-ANIONS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 7, Jul 82  
(manuscript received 30 Dec 81) pp 1506-1511

KORNUTA, P. P., BOBKOV, V. N., POLUMBRIK, O. M. and MARKOVSKIY, L. N.,  
Institute of Organic Chemistry, UkSSR Academy of Sciences

[Abstract] The title compounds (II) are postulated as the transition form during the oxidation of the corresponding phosphorine (I) to the phosphorinyl form (III) by atmospheric oxygen. Anions of type (II) can also be easily formed by the reaction of (I) with Na formate in absolute methanol, with Na amide in liquid  $\text{NH}_3$  or Na acetate in dimethylformamide (DMFA). The salts of (II) are stable in the solid state under argon; in solution they are much more stable towards oxidation in electron-donor solvents than in those considered electron-acceptors. (II) reacts with anhydrous HCl to form the hydrochloride

salt, with methyl iodide to yield the corresponding phosphorine, and with hydrogen resulting in recovery of the starting material (I). Several other reactions are considered. The introduction of the electron-acceptor phosphoryl group at the 3 position in the tetrazine ring increases the stability of the 1,2,3,4-tetrahydro-sym-tetrazines and gives them the ability to act either as a two-electron acceptor or a single-electron donor. Experimental procedures and structural confirmation, in particular EPR data, are given. References 12: 7 Russian, 5 Western.  
[319-12027]

UDC 547.24.+547.36'118

VINYL ESTERS OF PHOSPHORUS ACIDS, PART 21: VINYLOXYCHLOROPHOSPHORANES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 7, Jul 82  
(manuscript received 3 Feb 81) pp 1511-1520

KOLODKA, T. V., POVOLOTSKIY, M. I. and GOLOLOBOV, Yu. G., Institute of Organic Chemistry, UkSSR Academy of Sciences

[Abstract] The chlorination of a series of substituted vinyl-phosphites of the form  $\text{Cl}_x\text{P}(\text{OC}(\text{CH}_3)=\text{CCl}_2)_y$  for pairs of x and y of 0 and 3 (I), 1 and 2 (II) and 2 and 1 (III) respectively results in a new type of thermally-stable vinyloxychlorophosphoranes (VOCP's) for which x is increased by 2. Products of the chlorination of I - III have pairs of x and y equal to 2 and 3 (IV), 3 and 2 (V) and 4 and 1 (VI). VOCP's react with acetic anhydride resulting in the formation of vinyl-phosphates. (VI) reacts with aniline, m- and p-toluidines and o- and p-nitroanilines forming monomeric phosphazo compounds and with other reagents to form dimeric products. Stereo-chemically, the oxyvinyl group occurs in the axial position, the Cl atom in the equatorial position. A new easier synthesis, the reaction of methylamine with 1,1-dichloroacetone in the presence of  $\text{TiCl}_4$  is developed for obtaining a high yield of dichloroacetone methylimine, an  $\alpha$ -chlorinated ketoamide which is difficult to prepare using standard methods. Experimental methods and structural confirmations are given. References 17: 12 Russian, 5 Western.  
[319-12027]

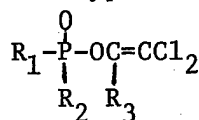


VINYL ESTERS OF PHOSPHORUS ACIDS, PART 22: STERIC HINDRANCE EFFECTS OF  $\beta, \beta$ -DICHLOROVINYL ESTERS OF PHOSPHONOUS ACIDS ON ACETYLCHOLINESTERASE OF WARM-BLOODED ANIMALS AND INSECTS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 7, Jul 82  
(manuscript received 21 Mar 81) pp 1544-1549

PESOTSKAYA, G. V., KIM, T. V., KISELEVA, Ye. I., Petrenko, V. S.,  
KASUKHIN, L. F. and GOLOBOV, Yu. G., Institute of Organic Chemistry,  
UkSSR Academy of Sciences

[Abstract] For compounds of the type



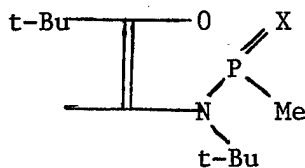
when  $\text{R}_1=\text{R}_2=\text{EtO}$ , substitution of  $\text{R}_3 = \text{CH}_3$  for  $\text{R}_3 = \text{H}$  greatly decreases the toxicity of these compounds towards acetylcholinesterase (AChE) deactivation while only slightly decreasing their insecticidal potency in vitro. Four compounds are considered:  $\text{R}_1 = \text{EtO}$ ,  $\text{R}_2 = \text{Me}$ ,  $\text{R}_3 = \text{H}$  (I);  $\text{R}_1 = \text{EtO}$ ,  $\text{R}_2 = \text{Et}$ ,  $\text{R}_3 = \text{H}$  (II);  $\text{R}_1 = \text{EtO}$ ,  $\text{R}_2 = i\text{-Pr}$ ,  $\text{R}_3 = \text{H}$  (III);  $\text{R}_1 = i\text{-PrO}$ ,  $\text{R}_2 = \text{Me}$ ,  $\text{R}_3 = \text{H}$  (V). Both the activation energy of AChE deactivation and insecticide potency increase with increasing size of  $\text{R}_2$ , the difference between II and III being much larger than that between I and II. The  $\text{R}_1$  position does not exert as great an effect, as the values for (the phosphonates) IV are intermediate between I and II. Thus, the steric shielding of the P by neighboring substituents may be used to increase the toxicity of compounds towards insects without a significant increase in danger to warm-blooded animals. References 11: 7 Russian, 4 Western.  
[319-12027]

ELECTRONIC AND THREE-DIMENSIONAL STRUCTURE OF FIVE-MEMBERED ORGANOPHOSPHORUS CYCLIC COMPOUNDS -  $\Delta^4$ -1,3,2,-OXAZAPHOSPHOLINES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 7, Jul 82  
(manuscript received 31 Jul 81) pp 1549-1554

BOLDESKUL, I. Ye., TARASEVICH, A. S., ANTIPIN, M. Yu., STRUCHKOV, Yu. T. and BALITSKIY, Yu. V., Institute of Organic Chemistry, UkSSR Academy of Sciences, Kiev; Institute of Heteroorganic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] The title compound, having the structure



for X = NPh, was prepared and characterized using X-ray analysis. Quantum-chemical calculations of electronic effects were made and compared to those of the previously-studied analog for which X = O. Bond lengths and angles were calculated; the P = N bond in the title compound is unusually short. Figures 2; references 7: 5 Russian, 2 Western.  
[319-12027]

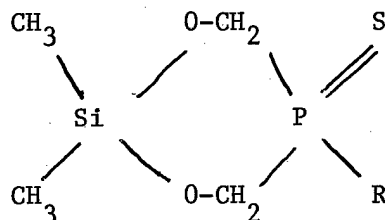
UDC 541.67:547.26'118

CONFORMATION OF 2,2-DIMETHYL-5-PHENYL-5-THIONO-1,3,2,5-DIOXASILYLPHOSPHORINANE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 7, Jul 82  
(manuscript received 8 Jan 82) pp 1688-1689

STRELKOVA, Ye. N., PATSANOVSKIY, I. I., ISHMAYEVA, E. A., KUDYAKOV, N. M., VORONKOV, M. G. and PUDOVNIK, A. N., Kazan' State University imeni V. I. Ul'yanov-Lenin, Irkutsk Institute of Organic Chemistry, Siberian Branch of the USSR Academy of Sciences

[Abstract] The three-dimensional structures of two compounds of the type



when R = C<sub>6</sub>H<sub>5</sub> (I) and R = (II), were established using <sup>1</sup>H, <sup>13</sup>C and <sup>31</sup>P NMR spectra and dipole moments (DM's). Dm's of the chair configuration having the P=S group oriented in the axial ( $\mu$  = 6.1D) or equatorial ( $\mu$  = 3.57D) directions confirm that the equilibrium mixture is about 90% equatorial. The conformation of the axial benzene ring deviates about 25° from the plane of symmetry. The benzene ring is approximately parallel to the main ring, a configuration which is stabilized by the interaction of the aromatic ortho-H atoms with the O atoms of the main ring. References 8: 7 Russian, 1 Western.  
[319-12027]

## REACTION OF VINYL ESTERS OF DIALKYLPHOSPHOROUS ACIDS WITH ORGANIC ACIDS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 52, No 7, Jul 82  
(manuscript received 17 Nov 81) pp 1690

GAZIZOV, T. Kh., BELYALOV, R. U. and PUDOVNIK, A. N., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch of the USSR Academy of Sciences

[Abstract] The vinyl ester of diethylphosphorous acid reacts with acetic acid (AcOH) to form diethylacetylphosphite (I) and the corresponding ketone (II). The reaction of AcOH with diethyl(2-keto-3-penten-4-yl)phosphite (III) also leads to the product (I) plus acetylacetone (IV). The reaction of AcOH with diethyl(3-hepten-4-yl)phosphite (V) also leads to the formation of (I) plus the dipropylketone (VI). The reaction path appears to be the protonation by the acid of either the ester O or the phosphite P. Both the enol form and (I) are formed; however, the product equilibrium is shifted towards (I) as the enol is removed from the system by its rapid conversion into the ketone. References 5 (Russian).

[319-12027]

## DISSOCIATION CONSTANTS OF POLYFLUORIDE CONTAINING PHOSPHORUS ACIDS IN VARIOUS MEDIA

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 7, Jul 82 pp 1491-1497

MATVEYEVA, A. G., KUDRYAVTSEV, I. Yu., GRIGOR'YEVA, A. A., MATROSOV, Ye. I., KUZNETSOVA, Ye. K., ZAKHAROV, L. S. and KABACHNIK, M. I., Institute of Heteroorganic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow; Voroshilovgrad Machinebuilding Institute

[Abstract] Continuing previous study of phosphorus acids' dissociation in various media, the title acids of phosphorus were studied to determine effects of the polyfluoride substituents and to evaluate their electron effect at the P atom. Alkaline hydrolysis of various phosphates produced bis(2,2,2-trifluoroethyl)phosphoric acid, bis(2,2,3,3-tetrafluoropropyl)phosphoric acid, bis(1,1-dihydroperfluorobutyl)phosphoric acid, bis(3,3,3-trifluoropropyl)phosphoric acid and the calcium salt of bis(1,1,5-trihydroperfluoropentyl)phosphoric acid. Analysis of these and other products showed that the polyfluoroalkyl radicals sharply strengthened the acids without changing the basic nature of the effect of the P atom's surrounding. Removal of the fluorinating group did not always reduce the strength of the acid. Potentiometric titration in chains with transfer was used to determine dissociation constants for in 50, 85, 95 and 100% alcohol and nitromethane solutions. An unusually strong

levelling effect of water-alcohol solutions on the strength of phosphoric acids containing polyfluorides was found. The values for polyfluoralkoxyl substituents varied fundamentally in aqueous and anhydrous media, although for 3,3,3-trifluoropropoxyl- and 3,3,3-trifluoropropyl groups those values were not related to the solvents. Figure 1; references 20: 13 Russian, 7 Western.  
[307-12131]

UDC 542.91:547.1'127

EFFECT OF CERTAIN HALIDE DERIVATIVES OF PHOSPHORUS AND SULFUR ON 1,2-BIS (HYDROXYMETHYL)-o-CARBORAN

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 7, Jul 82 (manuscript received 30 Nov 81) pp 1603-1605

KAZANTSEV, A. V., MEYRAMOV, M. G., KOVREDOV, A. I. and ZAKHARKIN, L. I., Institute of Heteroorganic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] A study was made of the reactions of  $\text{PCl}_5$ ,  $(\text{PhO})_3\text{PBr}_2$ ,  $(\text{PhO})_3\text{PCl}_2$ ,  $\text{Ph}_3\text{PBr}_2$  and  $\text{SOCl}_2$  with 1,2-bis(hydroxymethyl)-o-carboran. This reaction proceeded in an unusual manner, producing with  $\text{PCl}_5$  a spiroderivative and 3,4-(1',2'-o carborano)oxolane, and with  $\text{Ph}_3\text{PBr}_2$ , 1-bromomethyl-2-hydroxymethyl-o-carboran or 1,2-bis(bromomethyl)-o-carboran. With  $\text{SOCl}_2$  in the presence of pyridine a durable cyclical compound was obtained. These reactions with phosphorus and sulfur are apparently explained by the ease of ring formation including the o-carboran nucleus and the electron-acceptor impact of the carboranyl group. Chemical procedures are given in the experimental section. References 5: 3 Russian, 2 Western.  
[307-12131]

UDC 542.91:547.1'118

N-PHOSPHORYLATED 1,3,2-DIHETEROPHOSPHOLANES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 7, Jul 82 (manuscript received 26 Oct 81) pp 1624-1627

PUDOVIK, M. A., MIKHAYLOV, Yu. B., MIRONOVA, T. A. and PUDOVIK, A. N., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan Branch, USSR Academy of Sciences

[Abstract] New means are proposed for synthesizing derivatives of N-phosphorylated 1,3,2-oxazo- and 1,3,2-thiazaphospholanes. One approach to obtaining heterocycles with P-N-P systems is phosphorylation of oxazaphospholanes with NH or NSi groups. The first N-phosphorylated 1,3,2-thiazaphospholanes were

obtained by the reaction of orthoaminothiophenol with hexaethyltriaminophosphine. N-phosphorylated derivatives of 4,5-benzo-1,3,2-oxazaphospholanes and analogous thiazaphospholanes formed in a transamidation reaction, but they were thermally unstable and products of the reactions could not be isolated. Variations in back-to-back reaction constants were attributed to spatial factors. Chemical procedures are given in the experimental section. References 5: 3 Russian, 2 Western.

[307-12131]

UDC 542.91:547.1'118

REACTION OF 2,5-DIPHENYL-3,4-DIAZACYCLOPENTADIEONE-3,4-DIOXIDE WITH DIMETHYL ESTER OF VINYLPHOSPHONIC ACID

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 7, Jul 82 (manuscript received 17 Sep 81) pp 1627-1628

ARBUZOV, B. A., DIANOVA, E. N. and LISIN, A. F., Chemical Institute imeni A. M. Butlerov, Kazan State University imeni V. I. Ul'yanov-Lenin

[Abstract] Continuing study of 1,3-dipolar ring compounds of nitrons to esters of vinylphosphonic acids, the authors conducted the title reaction, anticipating both 1 : 1 and 1 : 2 products of the ring compounds. The reaction actually took place only at 150-160°C without a solvent, while with xylene it required 65 hours of boiling. In all tests 1 : 1 products formed. Analysis and infrared spectra data are summarized. The structure was 6-dimethylphosphono-3,5-diphenyl-2-N-oxide-on-8-oxa-1,2-diazabicyclo[3.3.0]octene-2. References 5: 4 Russian, 1 Western.

[307-12131]

UDC 542.91:547.1'118:547.571

REACTION OF DIETHYLDITHIOPHOSPHOROUS ACID ANILIDE WITH AROMATIC ALDEHYDES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 7, Jul 82 (manuscript received 30 Nov 81) pp 1643-1644

KOSTIN, V. P., SINYASHIN, A. G., BATYYEVA, E. S. and PUDOVNIK, A. N., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan Branch, USSR Academy of Sciences

[Abstract] To fill the void in information on the behavior of anilides of dialkyldithiophosphorous acids, the authors conducted the title reaction and determined that the reaction of S,S-diethyldithio-N-phenyladmidophosphite with benzaldehyde and p-nitrobenzaldehyde leads only to alpha-anilinodithiophosphonates. The structure of the products was confirmed by infrared and <sup>1</sup>N and <sup>31</sup>P NMR spectra, and their composition by elemental analysis. The nature of

the carbonyl compound did not affect the reaction, in contrast to that of anilidophosphites. Chemical procedures are given in the experimental section. References 5: 4 Russian, 1 Western.  
[307-12131]

UDC 542.91:547.1'118

#### REACTION OF PROPYLENE OXIDE WITH TETRAMETHYLDIAMIDOTHIOPHOSPHORIC ACID

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 7, Jul 82 (manuscript received 21 Jan 82) pp 1659-1660

NURETDINOVA, O. N. and GUSEVA, F. F., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan Branch, USSR Academy of Sciences

[Abstract] A study of the title reaction encountered the difficulty that after evaporation of the solvent, the title acid turned into a resinous mass. Thus the reaction was conducted without eliminating the solvent. Whereas reactions with dialkylthiophosphoric acids were not affected by excess oxirane, in this reaction excessive oxide increased the amount of resinous substances formed. Therefore, equimolar quantities were used. A cyclic product was also obtained from thion-thiol isomerization and intramolecular cyclization of a thiophosphate. Similar difficulties and resin formation were encountered with 2,3-butylene oxide. References 3: 2 Russian, 1 Western.  
[307-12131]

UDC 542.91:547.1'118

#### UNUSUAL REACTION OF TRIALKYLTRITHIOPHOSPHITES WITH TRICHLOROACETIC ACID

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 7, Jul 82 (manuscript received 9 Mar 82) pp 1671-1672

SINYASHIN, O. G., KARIMULLIN, Sh. A., BATYYEVA, E. S. and PUDOVNIK, A. N., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan Branch, USSR Academy of Sciences

[Abstract] The authors established that the title reaction did not follow the acidolysis reaction reported by Ofitserov et al (ZHURNAL OBSHCHEY KHIMII, 1980). Rather, a chloroanhydride of diethyldithiophosphorous acid, a triethyltrithiophosphate and the thioethyl ester of dichloroacetic acid formed. Structures were confirmed by infrared and NMR spectra and comparison of physicochemical constants with previous literature. References 3: 2 Russian, 1 Western.  
[307-12131]

UNUSUAL EFFECT OF ACID HALIDES OF CARBOXYLIC ACIDS ON DIALKYLACETYLDITHIO-  
PHOSPHITES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 7,  
Jul 82 (manuscript received 22 Mar 82) pp 1673-1674

KOSTIN, V. P., SINYASHIN, O. G., BATYYEVA, E. S. and PUDOVNIK, A. N.,  
Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan  
Branch, USSR Academy of Sciences

[Abstract] It is known that O,O-dialkylacylphosphites react with the title acid halides according to an Arbuzov reaction leading to formation of ketophosphonates. The authors established that in contrast to that reaction, S,S-dialkylacetyldithiophosphites react with acyl halides with substitution of the acetoxy group on the halogen to produce corresponding acid halides of dithiophosphorous acids and acetic anhydride. References 4 (Russian). [307-12131]

REACTIVITY OF 1, 3, 2-DIHETEROPHOSPHOLANES AND -PHORPHORINANES WITH A  
TETRA-COORDINATED PHOSPHORUS ATOM

Moscow USPEKHI KHIMII in Russian Vol 51, No 8, Aug 82 (manuscript received  
pp 1305-1336)

CHERKASOV, R. A., OVCHINNIKOV, V. V., PUDOVNIK, M. A. and PUDOVNIK, A. N.,  
Kazan' State University imeni V. I. Ul'yanov-Lenin; Institute of Organic and  
Physical Chemistry imeni A. Ye. Arbuzov

[Abstract] A literature survey is presented of the reactivities of 1, 3, 2-diheterophospholanes and -phosphorinanes with a tetracoordinated P atom and two other identical or different heteroatoms (O, S, or N). Comparison is also made of the reactivities of cyclic and acyclic organophosphorus compounds with identical ligands surrounding the P atom. The unique reactivities of the cyclic compounds are ascribed to the ease with which the coordination number of P atom can change in accordance with the following expression:  

$$P(IV) \rightleftharpoons P(V) - P(VI).$$
 Figures 3; references 189: 70 Russian, 119 Western. [333-12172]

## PESTICIDES

UDC 632.937:576.851.5.097.29

### QUANTITATIVE ANALYSIS OF BETA-EXOTOXIN IN INSECTICIDE PREPARATIONS BY METHOD OF HIGHLY EFFECTIVE ANION-EXCHANGE CHROMATOGRAPHY

Tashkent KHIMIYA PRIRODNYKH SOYEDINENIY in Russian No 3, May-Jun 82  
(manuscript received 10 Jul 81) pp 389-392

BUBENSHCHIKOVA, S. N., KAGRAMANOVA, V. K., BARATOVA, L. A., DANILOVA, E. B. and KRUGLYAK, Ye. B., Moscow State University imeni M. V. Lomonosov; All-Union Scientific Research Institute of Microbiological Means of Plant Protection and Bacterial Preparations, Moscow

[Abstract] Thermally stable beta-exotoxin that forms part of complex insecticides based on *Bac. thuringiensis* has been produced by complex and time-consuming methods. A simplified method is suggested for identifying beta-exotoxin with a column chromatographic approach. The Hitachi resin used was based on a styrene-divinylbenzene copolymer. To hasten analysis, the procedure was conducted at 50° C. Detecting the compounds in the eluate involved a spectrophotometric method at wave length 260 nm. For quantitative analysis of beta-exotoxin in unknown preparations, the authors constructed a calibrated curve of the dependence of the peak plateau of that substance on its concentration in the test sample. Data received from these analyses agree with those from thin-layer chromatography, and the procedure is recommended for production analysis during insecticide production. Methods of analysis are further described in the experimental section. Figures 4; references 17: 3 Russian, 14 Western.  
[311-12131]



## PRODUCTION AND FUNGICIDAL PROPERTIES OF N-TRIPHENYLSTANNYLIMIDES

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA  
TEKHOLOGIYA in Russian Vol 25, No 6, Jun 82 (manuscript received 23 Jul 80)  
pp 690-694

SHCHERBAKOV, V. I., ANISIMOV, A. A., STOLYAROVA, N. Ye., FEL'DMAN, M. S. and  
SMIRNOV, V. F., Department of Biochemistry and Physiology of Plants, Gor'kiy  
State University imeni N. I. Lobachevskiy

[Abstract] N-trialkylstannylimides are among relatively few tin-organic compounds with tin-nitrogen bonds that are resistant to humidity, and little has been published about their derivatives. The authors continue their previous work by reporting on the synthesis of the title imides and their fungicidal activity. Small concentrations of tin-organic compounds are known to suppress growth and development of fungi and bacteria, while withstanding high temperatures, preserving their activity for long periods, and combining well with polymers. Thus they are used to protect technical materials and artifacts from biodegradation. Where desired imides could not be obtained by azeotropic water removal, the N-triphenylstannyl derivatives were synthesized by the exchange reaction between triphenylstannic fluoride and the silver salt of the corresponding imide, such as phthalimide, succinimide or maleinimide. The tin-organic compounds obtained had imide fragments as well as succinate groups that were similar to metabolites of mold fungi. Results showed that all tested compounds were highly fungicidal and could be effectively synthesized. Chemical procedures are given in the experimental section. References 18: 10 Russian, 8 Western (one by Shcherbakov, et al.). [310-12131]

KINETIC FEATURES OF STEAM CATALYTIC CONVERSION OF N-HEPTANE

Kiev KHIMICHESKAYA TEKHNLOGIYA in Russian No 4, Jul-Aug 82  
(manuscript received 21 Apr 82) pp 15-18

MESHENKO, N. T., BUKHAL, N. I. and VESELOV, V. V., Gas Institute, UkSSR  
Academy of Sciences

[Abstract] Low-temperature steam catalytic conversion of hydrocarbons for home use and other purposes is gaining importance, but little has been published on its kinetics. The authors studied a wide range of steam consumption variations with pulverized nickel-chrome and nickel-aluminum-chrome catalysts at 320-360° C. Steam was mixed with hydrocarbon vapor in molecular balance before catalytic processing. Since the nickel-chrome catalyst was highly sensitive to heating, it had to be stabilized for tests above 340° C. Evaluation of the results is presented. The data obtained indicate that previously reported formulas representing the kinetics of such conversion are not universally applicable, but apply to low-molecular material with excess steam present. For the title conversion, reduction of the H<sub>2</sub>O: C ratio below a certain level brought an unacceptable loss of catalyst effective activity. Figures 6; references 17 (Russian).  
[316-12131]

UDC 541.64:547.315.3

STRUCTURE OF ACTIVE CENTERS OF POLYMERIZATION OF DIENES ON ZIEGLER-NATTA CATALYSTS

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 24, No 7, Jul 82  
(manuscript received 11 Nov 81) pp 1360-1367

MINSKER, K. S., PONOMAREV, O. A., KARPASAS, M. M., LOMAKIN, G. S. and MONAKOV, Yu. B., Bashkir State University imeni Fortieth Anniversary of the October Revolution; Institute of Chemistry, Bashkir Branch, USSR Academy of Sciences

[Abstract] Theoretical aspects of polymerization involving Ziegler-Natta catalysts are far less understood than are their practical applications. The present work studied the title structures of alpha and beta modifications of  $TiCl_3$  and of  $VCl_3$  combined with organic aluminum  $R_2AlCl$ . Selection was made on the basis of the effect of their stereospecific action during polymerization of certain charged dienes. The ionic nature of their chemical bonds and relatively narrow valent zones also justify modelling  $TiCl_3$  and  $VCl_3$  as single-sphere octahedron clusters. Calculation of chemical sorption was done by a two-atom complex method with a bond index to calculate saturation and bond direction. This method allowed consideration of chemical bond distribution during the formation of catalytic complex active centers. The structures obtained are diagrammed. Results showed that the positions of the R-group and the metal atoms are related to the steric effect of active centers on the transitional monomer-active center structure. Results also explain the impossibility of polymerization of certain monomers with voluminous substituents such as 1,4-diphenylbutadiene in the presence of Ziegler-Natta Ti-Al systems. Figures 2; references 16: 10 Russian, 6 Western.  
[301-12131]

BASIC PATTERNS OF BUTADIENE POLYMERIZATION AS AFFECTED BY COMPLEX SODIUM-ALUMINUM INITIATOR IN HYDROCARBON MEDIUM

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 24, No 7, Jul 82  
(manuscript received 27 Mar 81) pp 1530-1534

AREST-YAKUBOVICH, A. A., ANOSOV, V. I., BASOVA, R. V., ZOLOTAREV, V. L., KRISTAL'NYY, E. V., MAKHORTOV, A. N. and NAKHMANOVICH, B. I., Scientific Research Physicochemical Institute imeni L. Ya. Karpov

[Abstract] The use of zinc, aluminum or other alkaline earth metal alkyls in anion polymerization has been neglected since Lewis organic metal acids in such systems inhibit the reaction. This is a study of the basic principles of polymerization using a binary sodium-alpha-methylstyrene--triisobutyl-aluminum initiator. The initiator was synthesized in a medium of 4,4-dimethyldioxane-1,3 (DMD) at room temperature. The control test indicated that TIBA's stabilizing effect was not explained by its bonding of impurities in the solution. Molecular mass differences of the test polymer and other polymers formed using sodium initiators were great. The intensity of the chain transfer reaction grew, and the length of the induction period decreased, with increased temperature. In general, results indicated that binary sodium initiators are effective in producing SCB rubbers for various purposes. The aluminum component prevents DMD from stopping the reaction. Figures 2; references 13: 11 Russian, 2 Western.  
[301-12131]

UDC 541.64:537.3

FEATURES OF RADIATION ELECTRICAL CONDUCTIVITY OF SOME POLAR POLYMERS

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 24, No 7, Jul 82  
(manuscript received 30 Mar 81) pp 1540-1546

SAYENKO, V. S., SICHKAR', V. P., TYUTNEV, A. P. and POZHIDAYEV, Ye. D.,  
Moscow Institute of Electronic Machinebuilding; Scientific Research Physico-  
chemical Institute imeni L. Ya. Karpov

[Abstract] In recent years the principles of changes in radiation electrical conductivity during constant and impulse radiation have been learned for non-polar and weakly polar polymers. A method is described which allows measurement of radiation flows even in such polar polymers as PVC, PVDF and PMMA during prolonged effects of ionizing radiation from 5 mcs to 1 ms. The present article covers highly polar PMMA, polycarbonate, PVDF and cellulose triacetate. Test samples of from 10 mcm to 25 mcm thickness were irradiated with an EL/A 50/5 aggregate at 65 keV energy, in a dynamic vacuum of about  $3 \cdot 10^{-3}$  Pa with nearly homogeneous ion bombardment. Data showed that radiation electrical conductivity was correlated to the dose when the latter surpassed about  $10^5$  rads for polycarbonate and  $7 \cdot 10^5$  rad for other tested polymers. The authors studied volt-ampere characteristics of the polycarbonate radiation flow during constant gamma and ultraviolet radiation and determined that the flow grew in direct proportion to the tension of the external electrical field. Supplementary research showed that reverse ion flows observed earlier in polymers such as PMMA during irradiation were actually connected to the measuring methodology and were affected by the charge on the condensers used as a tension source and by leakage. Figures 5; references 14: 11 Russian, 3 Western.  
[301-12131]

V. G. KHLOPIN AND URANIUM-PLUTONIUM PROBLEM

Leningrad RADIOKHIMIYA in Russian Vol 24, No 4, Jul-Aug 82 (manuscript received 19 Feb 82) pp 401-410

KAZAREV, L. N., KOMLEV, L. V. (deceased), SINITSYNA, G. S. and KOVAL'SKAYA, N. P.

[Abstract] A synopsis is presented of the contribution of Vitaliy Grigor'yevich Khopin to the establishment and development of the Soviet nuclear power program. His radiochemical expertise, technological innovations, and administrative skills are briefly outlined, particularly in areas involving nuclear fission and the formation of transuranium elements. References 3 (Russian). [333-13173]

UDC 546.799.4'16+546.799.5'16+546.654'21+546.831'21

BEHAVIOR OF PLUTONIUM, AMERICIUM AND EUROPIUM IN FLUORIDE MELTS IN PRESENCE OF OXIDE EXTRACTANTS

Leningrad RADIOKHIMIYA in Russian Vol 24, No 4, Jul-Aug 82 (manuscript received 21 Dec 81) pp 411-418

ALEKSEYEV, V. A., ZIV, V. S., KLOKMAN, V. R., and MOROZOVA, Z. Ye.

[Abstract] Extraction of microquantities of plutonium, americium and europium from eutectic lithium and sodium fluoride melts, employing zirconium and lanthanum oxides as inorganic solid-phase sorbents, was conducted at 1023-1173° K. The extraction process was established to involve two steps, in which the initial formation of oxygen-containing Am, Pu, or Eu compounds occurred as a result of fluorine-oxygen exchange, followed by adsorption of these compounds to the solid phase. Evaluation of the equilibrium constants and Gibbs free energies showed that fluorine-oxygen exchange with zirconium oxide is possible only in the case of  $\text{PuF}_4$ , whereas with  $\text{La}_2\text{O}_3$  such exchange occurs with  $\text{PuF}_4$ ,  $\text{AmF}_3$  and  $\text{EuF}_3$ . Figures 3; references 14: 7 Russian, 7 Western. [333-12172]

## QUANTITATIVE EVALUATION OF EFFECT OF PROPERTIES OF ORGANIC PHASE ON EXTRACTION OF URANIUM AND THORIUM COMPOUNDS FROM AQUEOUS SOLUTIONS

Leningrad RADIOKHIMIYA in Russian Vol 24, No 4, Jul-Aug 82  
(manuscript received 20 Nov 81) pp 450-456

MAKITRA, R. G. and PIRIG, Ya. N.

[Abstract] Information in the literature was reviewed to delineate the effects of organic diluents on the extraction of  $UO_2^{++}$ ,  $Eu^{+++}$ , and  $Th^{4+}$  with secondary or tertiary amines and tributyl phosphate solutions. The effects of the organic phase can be accurately described by a linear poly-parametric equation covering specific and nonspecific solvation and binding energies. The electrophilic and binding energy parameters were the most significant factors in efficient extraction, while the polarity of the organic phase and its propensity for nonspecific solvation were relatively unimportant. References 22: 13 Russian, 9 Western.  
[333-12172]

## TARGET THEORY AND SYNERGISTIC EFFECTS IN RADIATION TREATMENT OF WASTE WATER

Kiev KHIMIYA I TEKHNLOGIYA VODY in Russian Vol 4, No 4, Jul-Aug 82  
(manuscript received 24 Jan 81) pp 304-306

CHUDIN, A. A. and SHUBIN, V. N., Central Scientific Research Institute of Agricultural Mechanization and Electrification in the Nonchernozem Zone of the USSR, Minsk

[Abstract] An analysis was made of factors responsible for inactivation of biological organisms in waste waters by ionizing radiation, based on gamma-irradiation (0.5 Gy/sec) of ascarid eggs and coccidia oocytes in the waste water of a pig farm with and without added KCl or  $CuSO_4$ . Both the Cl and Cu ions were found to lower  $D_{37}$  (dose at which 37% of the organisms originally present survive) because of their chemical effects on the biological targets. The data were interpreted in terms of the single hit target theory of radio-inactivation to indicate that the  $D_{37}$  value and the critical size of the target are characteristic features of the process of inactivation, and not of the biological target per se. The primary inactivation process in waste water subjected to ionizing radiation appears to involve interaction of the biological target with short-lived radiolytic products. Figures 2; references 9: 5 Russian, 4 Western.  
[330-12172]

## RUBBER AND ELASTOMERS

UDC 541.64:539.2:534.8

### ACOUSTIC STUDY OF STRUCTURAL CHANGES DURING STRETCHING IN HIGHLY FILLED POLYMER COMPOSITIONS BASED ON RUBBER

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 24, No 7, Jul 82  
(manuscript received 26 Dec 80) pp 1386-1390

YEPIFANOV, V. P., Institute of Problems of Mechanics, USSR Academy of  
Sciences

[Abstract] An attempt is made to define structural changes in highly filled rubber by well-known acoustical parameters during unidirectional stretching. Comparison of the experimental dependencies of weakening and the speed of acoustical wave spread on the number and dimensions of artificial defects with acoustical wave parameters during stretching was found to be the most effective method for determining damage. Defects were made by pricking the test samples from the side with needles. Results showed that a weakening of the sound signal and the effect of geometric dispersion caused by impoverishing the spectrum with high frequency components was a consequence of the accumulation of defects. The simple quantitative relation between acoustic values and defect sizes allowed determination of the effective magnitude of defects and development of a general principle regarding their accumulation during stretching along a single axis. In the next test, the sound was transmitted along the axis increasing its sensitivity to crack formation. In this manner it was possible to pinpoint the moment of cracking and follow accumulation kinetics. Figures 8; references 11: 9 Russian, 2 Western.  
[301-12131]

UDC 66.092.94

### KINETICS OF INDUCED THERMAL-OXIDATIVE DESTRUCTION OF ALTERNANT COPOLYMER OF BUTADIENE WITH PROPYLENE IN A MASS

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 55, No 7, Jul 82  
(manuscript received 11 Sep 80) pp 1625-1628

TRUNOVA, L. N. and PCHELINTSEV, V. V.

[Abstract] The title copolymer is found in numerous general purpose rubbers. Although it undergoes thermal processing readily, relatively little has been



published about the kinetics of that process. The authors studied basic kinetic procedures of the thermal oxidative destruction of the copolymer containing 89% 1,4-translinks, 7% 1,4-cis-links, 3% 1,2-links and 1% vinylidene. The sol-fraction was used with an initiator of 2,2,'-azo-bis-isobutyronitrile. The relation of rubber viscosity to average molecular mass viscosity was studied by gel chromatography, viscosimetry and osmometry. It was determined that the rate of oxidation of a rubber film up to 130 mcm in thickness was not limited by oxygen diffusion in the polymer at 90° C and with 0.18 mol/kg of the initiator. The low temperature suggested that the process was a chain, unbranched reaction. The tested copolymer was regarded to be more stable in thermal oxidation conditions than the widely used SKI-3 and SKD rubbers. Figures 5; references 5 (Russian).  
[312-12131]

## WATER TREATMENT

UDC 628.162

### CURRENT METHODS OF WATER TREATMENT FOR PESTICIDE REMOVAL

Kiev KHIMIYA I TEKHNLOGIYA VODY in Russian Vol 4, No 4, Jul-Aug 82  
(manuscript received 3 Mar 82) pp 329-344

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[Abstract] Current methods employed for the removal of various pesticides from water are reviewed. Particular attention is accorded to the use of aeration and oxidizing agents, as well as polar and nonpolar adsorbents. Coverage is given to certain technical aspects of treating water polluted with a mixture of pesticides. Figures 10; references 104: 1 Polish, 2 Ukrainian, 92 Russian, 9 Western.  
[330-12172]

UDC 579.695

### MICROBIOLOGICAL REMOVAL OF ANIONIC SURFACTANTS FROM INDUSTRIAL WASTE WATER

Kiev KHIMIYA I TEKHNLOGIYA VODY in Russian Vol 4, No 4, Jul-Aug 82  
(manuscript received 8 Oct 81) pp 368-370

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[Abstract] Bacterial cultures capable of biodegrading anionic surfactants were employed in an aeration tank to remove the latter from industrial waste water. The tanks were fitted with membranes containing the immobilized bacteria (*Pseudomonas* sp 2T/1, *Ps. putida* K, *Ps. rathonis* T) and, depending on the rate of water flow and oxygenation, the bacteria degraded 95-97% of the surfactants in the presence of an initial surfactant concentration of ca. 500 mg/L. Efficiency of the process decreases at higher surfactant concentration. Figures 2; references 5 (Russian).  
[330-12172]

## COMBINED BIOCHEMICAL TREATMENT OF OIL-CONTAINING EFFLUENT WATER AND EFFLUENT WATER FROM SYNTHETIC FATTY ACID PRODUCTION

Kiev KHIMIYA I TEKHNLOGIYA VODY in Russian Vol 4, No 4, Jul-Aug 82  
(manuscript received 1 Nov 81) pp 372-374

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[Abstract] Tests were conducted at the Nadvornaya Oil Refinery to evaluate the effectiveness of microbial treatment of a mixture of waste waters containing oil products and the effluent from a separate unit of the plant which produces synthetic fatty acids. The waste water contained 60-100 mg/L oil products, 8-10 mg/L phenols, 400-1000 mg/L sulfates, 250-400 mg/L Mg salts, and 8-40 mg/L hydrogen sulfide. Treatment efficiency increased with an increase in the effluent from the fatty acid unit up to a limit of 9.6%; a further increase in the quantity of waste water from the fatty acid unit in the aeration tank inhibited degradation. Figures 1; references 10: 6 Russian, 4 Western.  
[330-12172]

UDC 628.35

## BIOCHEMICAL TREATMENT OF WASTE WATER FROM EPOXY RESIN PRODUCTION

Kiev KHIMIYA I TEKHNLOGIYA VODY in Russian Vol 4, No 4, Jul-Aug 82  
(manuscript received 2 Feb 81) pp 376-379

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[Abstract] Studies were conducted to determine what levels of impurities could be satisfactorily removed from the title effluent on the conditions which would be a biochemical treatment (worked out by the authors' institute (1980 reference). Complete purification was obtained when the active silt had to deal with water containing organic substances, nitrogen, and phosphorus in a 100:4:0.6 ratio after the water was diluted 40-50 fold. The most characteristic organisms in the active silt were *Stylonichia pustulata*, *Opercularia gl.*, *Rotifer vulgaris*, and *Philodina roseola* (the latter was also most tolerant of the organic pollutants). References 11 (Russian).  
[330-12172]

ESSENTIAL PLANT OILS IN DISINFECTION OF DRINKING WATER

Kiev KHIMIYA I TEKHNLOGIYA VODY in Russian Vol 4, No 4, Jul-Aug 82  
(manuscript received 4 Dec 81) pp 379-380, 386

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[Abstract] Four essential plant oils preparations, BAB-1, BAB-2, BAB-5 and  
BAB-6, were shown to be bactericidal for E. coli K-12 and 163. The hypothesis  
is advanced that such oils [BAB = biologically active substances] may be  
used in the disinfection of drinking water since, in addition, they also  
possess hypotensive, antihistaminic, desensitizing, invigorating, anti-  
spastic, and other properties. Figures 2; references 9: 1 Ukrainian,  
8 Russian.  
[330-12172]

CSO: 1841

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